STRUCTURAL FAILURES

HEARING

BEFORE THE

SUBCOMMITTEE ON
INVESTIGATIONS AND OVERSIGHT

OF THE

COMMITTEE ON
SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

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STRUCTURAL FAILURES

WEDNESDAY, APRIL 25, 1984

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT,
Washington, DC.

The subcommittee met, pursuant to call, at 9:30 a.m., in room 2318, Rayburn House Office Building, Hon. Albert Gore, Jr. (chairman of the subcommittee), presiding.

Mr. GORE. The subcommittee will come to order. I would like to welcome all of our guests and our witnesses.

All of us here are aware of the costs involved when major public structures prematurely fail in the United States. The costs of these tragedies can be measured in lives lost and injuries incurred, the enormous financial penalties that result from repairs and liability claims, and the damage to reputations, and erosion of the public's confidence.

Eradicating these failures should be a top priority. In pursuit of that goal, this subcommittee began a rather lengthy and exhaustive investigation into this problem with a hearing in August 1982. This was followed by a lengthy survey of expert observers, and both efforts resulted in the subcommittee issuing a report last month addressing the major contributing factors that led to these structural failures.

It was not our intent then, nor is it now, to establish specific blame or culpability for problems such as the collapse of the Kansas City Hyatt walkway. Rather, we were interested in identifying generic problems that could possibly be corrected.

Our findings ranged from identifying difficulties in how architects and engineers were selected to financial pressures that affect quality. But one of the consistently identified problems was the lack of a central repository of information on the causes of these mistakes, where the relevant professionals could go for consultation.

Quite simply, we have not in the past had a mechanism by which we can learn from our mistakes. The reasons for this vary. They vary from the worst-case scenario of the John Hancock Building in Boston, where all the windows fell out and where the cause of the falling windows was kept secret, and is kept secret to this day, by the settlement in the litigation, so that the relevant professionals who might want to avoid a similar mistake in the future cannot find out how to do so. That is clearly a terrible public policy.

There are other causes, of course. The more usual circumstances involve an investigation or an analysis of a failure taking place

with the results winding up in the files of some law firm, where, as a practical matter, they are not accessible to the people who need to see that data.

An investigation is of precious little use if the collective construction industry has no practical way to learn from that mistake. Thus, it is our continuing effort today to review measures and initiatives that we believe can correct this glaring problem.

First, we will hear from the appropriate trade associations about their opinions on how such a repository should be created; second, we will hear from representatives from the Architecture and Engineering Performance Information Center, known as AEPIC, which may very well be able to play a key role in the initiative we are all looking for; and last, we will solicit opinions on some legislation being promoted by the subcommittee to give the National Bureau of Standards the authority and the responsibility to address this problem.

This legislation, incidentally, is moving along quite nicely and now has to be considered by the Senate. Hopefully the record of this hearing will help in that regard as well.

I want to thank all of our witnesses in advance for taking the time to appear here today. I'd like to ask the first witness to come to the panel, Dr. Donald—before I ask the first witness to come, I'd like to recognize the ranking minority member of our subcommittee, Mr. Skeen.

Mr. SKEEN. Thank you, Mr. Chairman. I have no statement this morning other than to point out that we did put some language in the law having to do with structural failures. I have a statement that we will just enter in the record, then, and we'll get on with the hearings. I commend you for having them and thank you, Mr. Chairman.

Mr. GORE. Without objection, we'll put that in the record at this point.

[The opening statement of Mr. Skeen follows:]

OPENING STATEMENT

HONORABLE JOE SKEEN

HEARING ON STRUCTURAL FAILURES

APRIL 25, 1984

Thank you Mr. Chairman. I am looking forward to this mornings hearing on the importance of disseminating data about the causes of structural failures. Because of the apparent increase in the number of such failures and the need to prevent them in the future, the Subcommittee, under your leadership, undertook a careful review of a number of structural failures in public structures such as buildings, dams, and bridges.

Following the Subcommittee's investigation, a report was released which listed six critical factors as the causes of structural failures. One of the most important, was the finding that the lack of a central body to investigate failures, coupled with the lack of a central repository of data concerning these failures, makes it impossible to learn from our mistakes.

In response to this finding, I offered an amendment to the National Bureau of Standards Authorization bill for Fiscal Years 1984 and 1985 which would authorize the Bureau to conduct, on its own initiative, and in cooperation with appropriate state and local agencies, investigations to determine the technical factors contributing to failures in structures which are used by the general public.

The Amendment was adopted unanimously by the Subcommittee on Science, Research and Technology a few weeks ago, and, coincidentally, will be voted on today by the full House of Representatives as we consider the NBS Authorization bill.

Again, I would like to commend you for calling this hearing, and I look forward to a lively discussion of the issues.

Mr. GORE. I'd like to call our first witness now, Dr. Donald Vannoy, executive director of the Architectural and Engineering Performance Information center at the University of Maryland; accompanied by Dr. John Loss, director of Technical Services; and Neal FitzSimons, Chairman of the AEPIC Advisory Board.

If you all would come to the witness table and if—starting on my left, your right, if you would identify yourselves to the reporter.

Mr. FITZSIMONS. I am Neal FitzSimons, in private practice, Kensington, MD., and Chairman of the AEPIC Advisory Board.

Dr. VANNOY. I am Donald Vannoy, executive director of AEPIC, University of Maryland.

Dr. Loss. And I am John Loss, professor of architecture at the University of Maryland, and codirector of AEPIC.

Mr. GORE. Very good. I want to welcome all three of you and I apologize, Mr. FitzSimons, for mispronouncing your name the first time through.

Dr. Vannoy, I believe you have a prepared statement and without objection, it will be included in the record. We invite you to present it or summarize any portions of it as you see fit. We are delighted to have you here, so please proceed.

STATEMENT OF DR. DONALD VANNOY, EXECUTIVE DIRECTOR, ARCHITECTURAL AND ENGINEERING PERFORMANCE INFORMATION CENTER, UNIVERSITY OF MARYLAND; ACCOMPANIED BY DR. JOHN LOSS, DIRECTOR OF TECHNICAL SERVICES; AND NEAL FITZSIMONS, CHAIRMAN OF AEPIC ADVISORY BOARD

Dr. VANNOY. Thank you.

I'd like to show you some slides.

[Slide.]

So if I could turn the slide projector on and have John help me, I will review them.

[Slide.]

The Architectural and Engineering Performance Information Center, AEPIC, was funded by the National Science Foundation on July 1, 1982, for a period of 2 years. The objective of AEPIC is the collection and dissemination of information on the performance of projects.

[Slide.]

Everyone has become aware that structural and other building failures are costly and pose hazards to health and safety. Some of the most publicized events, such as the progressive collapse of Baileys Crossroads, may not be the most representative or indicate the nature and scale of the real problem.

[Slide.]

Some failures are not well publicized, such as the collapse of this wood dome in Louisiana, due to lateral instability during construction. A feedback mechanism needs to be in operation to learn from the past mistakes. Most failures have no single cause.

[Slide.]

Some failures, such as the concrete flat-plate condominium in Cocoa Beach, FL, are identical to failures which occurred several times before.

[Slide.]

Some types of structures have a certain critical connection details, such as punching sheer around the column.

[Slide.]

Other failures on the construction site include crane failures and the resulting danger to worker safety. Performance of materials impact upon structural performance. More than 90 percent of the performance problems are not structure failures, but water penetration problems, maintenance problems, durability of materials, heating, ventilation, air-conditioning and lighting problems, communication and functional.

Can I have just a few lights on? Not all of them, but just a few. Happy medium. Some of the slides might be dark.

[Slide.]

AEPIC is collecting overall performance information. Information is being collected on roofing.

[Slide.]

Such as this inflatable structure in Minneapolis. Roofing problems resulting in water penetration, which lead to corrosion and other structural problems.

[Slide.]

For example, the Berlin Congress Hall, are being collected.

AEPIC is collecting information on the performance of structures due to natural forces such as landslides, which was the previous slide, and earthquakes.

[Slide.]

This pictures landslides; this is the earthquake.

[Slide.]

This is a hospital in California and that is the stairwell which fell away from the building which would discourage its use during an emergency. [Laughter.]

[Slide.]

This is the sunscreen which collapsed and trapped the emergency vehicles under the structure. Even minor structures are important in planning emergency facilities. What you can't see because of the lighting here is under the sunscreen is the emergency vehicles which could not leave the parking lot during the time in which they were needed. So even minor structures are important in planning emergency facilities.

[Slide.]

As adversary processes, litigation, settlement and resolution efforts in individual project disputes have completely different goals from a technical analysis of problems of performance, it would be surprising if unbiased, dispassionate, detailed event reports were produced from such struggles.

[Slide.]

This is the Teton dam failure—because of the lighting, you can't see it that well.

[Slide.]

At AEPIC, we are aware of much frustration over sealed records in known construction failures.

[Slide.]

This happens to be plywood on the windows of the Hancock Building.

This limited accessibility in isolated incidents should not be exaggerated. However, it has been our experience that much case data of very useful quality and detail has been forthcoming from a representative cross-section of the industry and professions with whom AEPIC has corresponded some counsel.

[Slide.]

This is the AEPIC organization and I have several points to make here. First, AEPIC is an international center housed at the University of Maryland. We will establish international repositories in several foreign countries. The objective here is to collect information and disseminate it into a uniform format.

Also, you will notice there that there are several correspondents right now helping AEPIC to collect information. Samples of this performance and document citation report form have been provided to you. We currently have over 700 professional people submitting data to AEPIC.

[Slide.]

We also have an Advisory Board of AEPIC. These are nine experts who basically set policy and give us guidance in the operation of AEPIC. They are Neal FitzSimons, who is Chairman of the Advisory Board. He is with me here today. Also on there is Gordon Dalrymple of Law Engineering & Testing. We have Paul Genecki, who

is vice president of Victor O. Schinnerer & Co.; Richard Getsinger, who is vice president of George Hyman Construction Co.; John Gnaedinger, who is with STS Consultants; Earle Kennett, who is administrator for Research for the American Institute of Architects; we have Dr. Al Knott, with Knott Laboratory in Denver, CO; Paul Lurie, an attorney; and Randall Vosbeck, who is an architect with his own firm VVKR Incorporated.

Another important part of AEPIC organization is the Advisory Council. The Council is the liaison between AEPIC and membership societies. We have established liaisons with such societies as the American Society of Civil Engineers, the National Society of Professional Engineers, the American Institute of Architects, Construction Specification Institute, the American Consulting Engineering Council, ASTM, and other organizations.

This is an important activity of AEPIC because it provides a two-way exchange for collection and dissemination of information to organizations which represent a membership.

Another important point shown there is the advisory committees. This is important for one reason: for collecting and disseminating performance information. There are nine advisory committees in AEPIC. They are the Codes and Specifications, Education, Insurance, Legal, Media, Owners, Professional Practitioners, Research and Technical. Each of these committees will assist in collecting and disseminating information and each committee will work with the data to improve performance as it relates to that committee.

These nine committees will meet at the Third International Conference, which will be hosted by the American Institute of Architects, May 21 and 22, 1984, in Washington, DC.

The Second International Conference was held at the University of Maryland in June 1983. Representatives from 30 States and 7 foreign countries attended, and they assisted AEPIC in the development of the performance report and document citation form, which have been provided to you.

The important key here—the point to make here is that if you collect and disseminate information, it should be in a standard format where lessons to be learned can be shared by others. AEPIC also plans to publish a newsletter and a journal to disseminate the information.

In addition, we are planning seminars, conferences, and workshops. The first seminar will be water penetration in the building envelope; the second one planned is failures in excavations.

The information in AEPIC can be used for a variety of reasons. I would like to emphasize some points here for the record. One is planning new projects. If you had such a data base, searches of past problems could be done in the data base to eliminate future problems such as what happened in the slide I showed you of Cocoa Beach. You could use it for reviewing existing projects for rehabilitation and restoration; you could use it for teaching case studies. That is, if you had information collected, the case studies could be used in the undergraduate and graduate education of architects and engineers before they start practicing.

You could use it for modifying codes and regulations. This is an important aspect because model building codes are commonly developed by committees and codes are commonly also developed by

one individual on that committee. AEPIC will expand the knowledge base if you can collect and disseminate the information.

You can use it for planning research, and this is an important aspect, because you could establish priorities to the development of research problems. The data base will basically tell you what problems you should actually be researching. If you did a search of the data base and found that there were 200 problems occurring in a system during the past year, then you could identify that as a problem and address it.

You could use it for preparing professional texts, as I said, in studying cases and making them available. You could use it for investigating for dispute resolution, for developing new products for the industry. This feedback mechanism would help improve products by reporting on the performance in improving the products for the future.

You could use it for implementing effective quality control measures. You could use it for improving professional and industry practice, and most important, creating in-house resource bases with lessons learned from project performance.

This is important because local, State, Federal agencies and private businesses could set up their own in-house data base which can be used for improving performance. This information can be shared to eliminate some problems from reoccurring. Common problems commonly happen between agencies, but there is no way in which it can be shared between them, all this basically in order to improve professional practice and prevent the repetition of poor practice.

The users of AEPIC will be many and varied. Architects, engineers, contractors, developers, manufacturers, lawyers, building owners and users, governmental agencies, insurance underwriters, and others interested in the objectives of AEPIC can take advantage of the computerized collection of performance data and related information.

We have enclosed a brochure into the materials submitted to you. You will notice that we have adopted the owl as our logo of AEPIC. It is the symbol of the master builder from ancient Egypt.

Also, I would like to thank you on behalf of AEPIC to—for the opportunity to address this group. I would be glad to answer any questions that you have on my presentation, the written material that's been submitted to you, or on AEPIC. Also, John Loss, the co-Director and the architect on the project, and Neal FitzSimons, who is a professional practitioner and Chairman of the AEPIC Advisory Board are here to answer any questions that you might have for us.

Thank you.

[The prepared statements of Dr. Vannoy, Mr. Loss, and Mr. FitzSimons follow:]

Statement of

Dr. Donald W. Vannoy, P.E.
Executive Director and
Director for Engineering

John Loss, AIA
Director of Technical Services and
Director of Architecture

Neal FitzSimons, C.E.
Chairman of AEPIC Advisory Board

Architecture and Engineering Performance Information Center
3907 Metzerott Road
University of Maryland
College Park, Maryland 20742

Before the

U.S. House of Representatives
Committee on Science & Technology

Subcommittee on Investigation and Oversight on Causes
of Structural Failures in Public Facilities

Room 2318
Rayburn House Office Building
Washington, D.C. 20515

April 25, 1984

Introduction

As the buildings and civil structures of our nation are growing older, the design professionals, the building industry and construction trades, the federal, state and local governments, and the public have all experienced an increasing awareness that building and construction failures must be addressed on a national scale. Architects, engineers, members of the construction industry and technical organizations have taken strong leads in continuing improvement of practice, quality control and risk management for both self-interest and, to their credit, for the public interest. The pattern of information sharing has been set by architects and engineers and others closely involved in the building process. This sharing has, until recently, been limited to individual groups' intramural or intraprofessional efforts. However, each element of this industry has, over the last two years, made a commitment to contribute to a comprehensive, detailed, national and international center for data on building and construction problems and, more importantly, on solutions for those building and construction problems. That central repository is AEPIC.

The objective of AEPIC is the improved design and construction and therefore, the increased quality, longevity and safety of buildings and civil structures. That goal is based on the premise that collection, analysis and dissemination of information about performance (failures, malfunctions and deficiencies as well as improper procedures and practices) will improve the quality of buildings and civil structures, as well as improve professional practice and discourage repetitions of poor practice. AEPIC promotes organized information exchange and professional and industrial educational gatherings to refine factual data into improvements in performance based on increased knowledge.

The Center intends that engineers, architects, contractors, developers, manufacturers, lawyers, building owners and users, federal and state agencies, insurance underwriters, university and private research organizations and others interested in the objectives of AEPIC have access to this computer-based collection of performance information. Such groups and individuals may use the information to:

- analyze and improve design of current and future projects
- review existing construction to repair potential problem conditions pointed out by data
- improve rehabilitation and restoration techniques and efforts
- modify codes and regulations with factual cases
- guide research effort for maximum quality and cost benefit
- enhance professional education with factual cases
- investigate solutions in disputes
- aid development of products and materials
- improve industry practice and management
- direct effective quality control measures
- promote conferences among architects, engineers and industry to eliminate common performance and management problems and to refine the construction process not just for economic gain and efficiency, but to achieve more long-term gains which involve minimal short-term investment.

AEPIC Performance Data

Performance is meant in the general sense of the word: "fulfillment of a claim, promise, request, need or expection." Performance information about buildings and civil structures thus includes all aspects of problems arising in areas such as the building envelope, structure, mechanical, electrical, moisture barriers, economics, and environment, as well as thermal, acoustic, visual and behavioral dysfunctions. All AEPIC performance data will relate to materials, elements, systems, processes and procedures. Data will be coded and classified without sensitive or personal information, to protect the privacy of involved individuals and firms and to avoid the "defensive posture" brought by a search for guilty parties rather than performance information about materials, elements and systems.

All data is arranged in either computerized data files or in libraries and will include:

- Computerized "Performance Incident" or "Case" Files: professional and "informed reporter" reports on actual performance problems or malfunction, such as water damage, masonry disintegration, structural collapse or distress, indoor air quality, etc.

- Computerized "Citation" Files: Bibliographic references to published information about performance problems which appear in journals, newspapers, agency investigation reports, etc., similar to the MEDLARS System maintained by the National Library of Medicine.
- Dossier Library: Documentation of performance data about the incidents and related information in the "case" files.
- Visual Materials Library: Photographs, slides, and other visual material related to the "case" files.
- Reference Library: Current and historical codes, standards and other technical references.

AEPIC Data Sources

The sources of data for AEPIC are many and varied. Several hundred architectural and engineering firms have expressed a desire to contribute data to and receive data from AEPIC. Approximately one hundred and fifty of these firms have also aided AEPIC in the development of its data organization. The insurance industry has been a significant contributor to AEPIC. In addition, building inspectors, building owners, managers and their agents are correspondents to AEPIC. The special Performance Report form and Document Citation form are now ready for use in the comprehensive collection of performance data from all sources.

Founding of AEPIC

The Architecture and Engineering Performance Information Center (AEPIC) was founded at the University of Maryland in July, 1982. The Center, a joint endeavor of the College of Engineering and the School of Architecture at the University of Maryland, was given its initial support by a small National Science Foundation grant. That grant, with considerable additional support by the University of Maryland, its College of Engineering, Department of Civil Engineering, and Computer Science Center, the Victor O. Schinnerer & Company, the Sperry/Univac Corporation and many others whose enthusiasm and dedication to the project now may make it possible for the Center to enter the operational phase of its development.

AEPIC Organization

The University of Maryland serves as the International Center and the National Repository of AEPIC. A number of international repositories are also being developed in other countries. The most advanced developments are currently in Canada and the United Kingdom. The international repositories will significantly broaden the base of AEPIC users and contributors.

It is the intention of AEPIC to create a publication for members to share "trend analysis" of the collected data on a regular basis. Information will also be available by regular correspondence and through electronic communication, especially with the international repositories. AEPIC will offer selected portions of the data analysis for the newsletter or bulletin of the professional societies. Plans are in process for the development of a "journal of performance analysis" which will emphasize the theoretical and conceptual issues of performance and performance analysis.

The Future of AEPIC

The major thrust of activity in the immediate future will be the expansion of the reporter network. Components and chapters of the professional and technical organizations, and local building departments, building inspection agencies, federal agencies and others have been contacted and enlisted to create an effective network of reporters for performance data.

Prior to the development of AEPIC, reports of performance failures were made but were, unfortunately, filed in isolated storage throughout the world. No centralized source of data on performance was available. During this next year, it is hoped that the routine operations of AEPIC will be well established at the University of Maryland and the international repositories will begin operations in several countries outside the U.S. This should lead ultimately to a diminishing rate of performance failures, fewer confrontations in the courts, an improved process in the development of codes and standards and a reduction in insurance premiums. In the future it is reasonable to expect that the normal process of design analysis will include a summary of AEPIC data for the building structure and material type contemplated. For this investment, a short-term cost, this data can be used to prevent

short-term and long-term problems, expenses and hazards from materializing.

AEPIC Staff

Donald W. Vannoy, P.E. - Executive Director and Director of Engineering

John Loss, AIA - Director of Technical Services and Director of Architecture

Neal FitzSimons, C.E. - Chairman of AEPIC Advisory Board

Janet B. Seifert, J.D. - Research Analyst

Steve Smith - Research Assistant

Yvonne Thelwell - Research Assistant

Ruth Lockwood - Secretary

ARCHITECTURE, ENGINEERING AND CONSTRUCTION: PERFORMANCE
AEPIC: The Architecture and Engineering Performance Information Center

by John Loss, AIA.

Architects and engineers have displayed a long history of interest in building performance. Along with their colleagues in construction, they have studied the failures of major structures in the world. Many pursue the questions: Must London bridges fall down? Why does the tower at Pisa lean? What causes a cathedral to collapse? The failure of Beauvais Cathedral in 1284 is probably one of the most extensive continuing studies of a dramatic collapse of a major structure.

This historical interest in performance presages our current awareness. We hear all too frequently of the failure or collapse of major buildings, bridges, and other structures, often resulting in an unfortunate loss of life. Multitudes of lesser problems, such as a leaking roof, wall or skylight, add up to the largest single source of economic loss in the entire building inventory. Design professionals are faced with ever-increasing risks of litigation and ever-mounting insurance premiums.

The professional societies in Architecture and Engineering have responded to some of these issues in a number of ways. The American Institute of Architects appointed two special task forces: one, to clarify the reasons for the failure of long-span structures; another, to address the problems of life safety. The American Society of Civil Engineers have created two special committees: the Committee on Forensic Engineering and the Engineering Performance Information Committee. All the professional societies have developed related programs and created committees to address the problems of professional liability.

In 1984, seven hundred years after the failure of the Cathedral at Beauvais, AEPIC will provide the opportunity to address the entire, critical issue of performance in a comprehensive program for all interested in the built environment. Architects can now begin to do something about performance failure by becoming a member of the Architecture and Engineering Performance Information Center (AEPIC) at the University of Maryland. Architects and engineers, indeed, all professionals engaged in the design, construction and use of buildings, have long recognized their obligation to remain well-informed of standards and performance failures related to their work. AEPIC will now provide the data base from which the professional can more conscientiously fulfill that obligation. That first giant step to reduce the performance failures of our buildings can be taken.

Founding of AEPIC

AEPIC was founded at the University of Maryland in July, 1982. The Center, a joint endeavor of the School of Architecture and the College of Engineering at the University of Maryland, was given its initial support by a National Science Foundation grant of approximately $150,000. That grant, with considerable additional support by the University of Maryland, the College of Engineering, the Department of Civil Engineering, Victor O. Schinnerer & Company, Sperry/Univac Corporation and others with enthusiasm for the project has now made it possible for the Center to enter the operational phase of its development.

The objective of AEPIC is the improved design, construction and performance of buildings and civil structures. That goal is based on the premise that collection, analysis and dissemination of information about performance (failures, malfunctions and deficiencies as well as improper procedures and practices) will improve the quality of buildings and civil structures, as well as improve professional practice and discourage repetitions of poor practice.

The Center foresees that architects, engineers, contractors, developers, manufacturers, lawyers, building owners and users, federal and state agencies, insurance underwriters, university and private research organizations and others interested in the objectives of AEPIC will have access to this computer-based collection of performance information to assist in improving the performance of the industry. The information will be structured for use in:

1. Planning new projects
2. Reviewing existing projects for rehabilitation or restoration
3. Teaching case studies
4. Modifying codes and regulations
5. Planning research
6. Preparing professional texts
7. Investigating for dispute resolution
8. Developing new products for the industry
9. Implementing effective quality control measures
10. Improving professional and industry practice
11. Creating an in-house resource base with lessons learned from project performance

AEPIC Performance Data:

Performance should be understood in the more general sense of the word: "fulfillment of a claim, promise, request, need or expection." Performance information about buildings and civil structures would thus include all aspects of problems arising in areas such as the building envelope, structure, mechanical, electrical, moisture barriers, economics, and environment, as well as thermal, acoustic, visual and behavioral dysfunctions. All AEPIC performance data will relate to materials, elements, systems, processes and procedures. Data will be coded and classified without sensitive or personal information, to protect the privacy of involved individuals and firms.

All data is arranged in either computerized data files or in libraries and will include:

- Computerized "Performance Incident" or "Case" Files: professional and "informed reporter" reports on actual performance problems or malfunction, such as water damage, masonry disintegration, structural collapse or distress, indoor air quality, etc.
- Computerized "Citation" Files: References to published information about performance problems which appear in journals, newspapers, agency investigation reports, etc.
- Dossier Library: Documentation of performance data about the incidents and related information in the "Case" files.
- Visual Materials Library: Photographs, slides, and other visual material related to the "Case" files.
- Reference Library: Current and historical codes, standards and other technical references.

AEPIC Data Sources:

The sources of data for AEPIC are many and varied. Several hundred architectural and engineering firms have expressed a desire to contribute data to and receive data from AEPIC. Approximately one hundred and fifty of these firms have also aided AEPIC in the review of "reporting forms." The insurance industry has been a significant contributor to AEPIC. In addition, building inspectors, building owners, managers and their agents are correspondents to AEPIC. The special "performance report" forms and "citation" forms are now ready for use in the comprehensive collection of performance data from all sources. Of approximately 40,000 files currently stored, the primary contributor of data has been the Victor O. Schinnerer & Company, providing a vital contribution to the early development of AEPIC.

AEPIC Organization: (See Fig. 1)

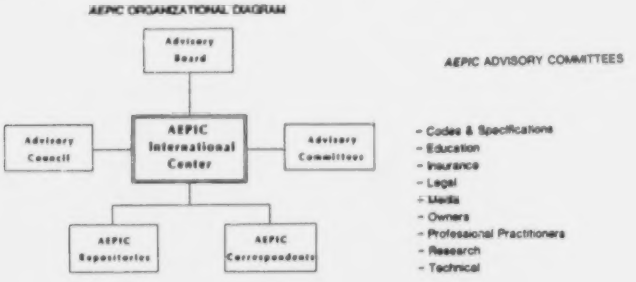


Fig. 1

The University of Maryland serves as the International Center and the National Repository of AEPIC. A number of international repositories are also being developed in other countries. The most advanced developments are currently in Canada and the United Kingdom. The international repositories will significantly broaden the base of AEPIC users and contributors.

An Advisory Board of nine distinguished persons has been appointed to provide advice and guidance on AEPIC policies, programs and technical operations. The Advisory Board was selected for their expertise in architecture, engineering, engineering testing, geotechnical analysis, insurance, law, contracting and research.

In addition, an Advisory Council and nine Advisory Committees have been formed to provide liaison between AEPIC and membership organizations, technical and trade associations, councils and institutes and major agency media, research, educational, legal and technical user networks. Approximately one hundred and fifty members of the council and committees are assisting in dissemination of information about AEPIC, encouraging their constituencies to contribute data

to AEPIC and reviewing AEPIC functions in terms of their interests as users and contributors. All persons, individually or as a representative of an organization, who are interested in the objectives of AEPIC are invited to participate as a member of one of the advisory committees.

Several hundred professional firms, agencies, organizations, institutions and individuals are "correspondents" to AEPIC. They have no council or committee affiliations but information is shared on a mutual-interest basis. Several selected individuals are appointed as "correspondent reporters" who assist AEPIC from particular regions of the country by sharing news of interest, assisting in distribution of AEPIC material, and clarifying AEPIC objectives.

The Third International Conference of AEPIC in May 1984 marked the formal inauguration of the Advisory Council and the Advisory Committees and launched AEPIC into its essential period of growth.

Access to AEPIC

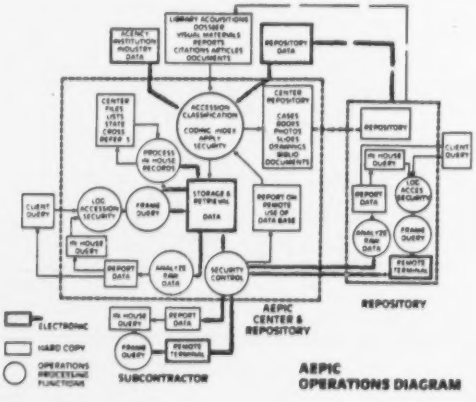
Membership in AEPIC is now available. The process of access to the Center's data is an annual membership fee plus a $75.00 search fee for each basic search. A query is conducted by "keyword" of KWIC and the results of the search are sent in simplified format to the inquirer who can then request more detailed information or additional information. Annual memberships are available for individuals, firms, organizations and corporations, fees ranging from $100 per year to $800 per year, depending on firm size. Special memberships are offered at $1,000 per year for "Sponsors" and $5,000 per year for "Patrons." It should be remembered that the NSF support of AEPIC terminated in June 1984, after which AEPIC must become a self-supporting, non-profit center.

Operations & Functions (See Fig. 2)

The vital core of AEPIC is data: data which is relevant, accurate and, especially, accessible. Data enters the Center in many forms and after appropriate classification, coding and indexing proceeds to proper files (electronic or manual). The computer-based files are coded for security and all access to the computer-based material goes through security control. Thus, security for sensitive data is maintained. The "client query" is fundamentally the same whether it is an individual client, a subcontractor, an in-house query or a request from a repository. The major functional difference is the "security control" applied to all remote terminals which access the Center's data in computerized storage.

The client query at an international repository is conducted in the same manner as that at the University of Maryland Center. The format, process and keyword techniques are basically the same at all centers.

Care and precision in the choice of words is very important in framing a query to access the computerized data base. AEPIC has no intention of creating a highly specialized language which would render the access difficult for the typical user. It is necessary only that the user (and reporter) identify the reference base for the word usage, e.g., CSI, ASTM, CIB, NFPA, AIA Standard Documents, etc. The user and reporter thus use words which are familiar to them and the computer can cross-reference them for effective storage and search routines.



AEPIC OPERATIONS DIAGRAM Fig. 2

Custom Services of AEPIC:

AEPIC provides special programs of collection and analysis of performance data in the "subcontractor" mode (See Figure 2). Businesses, corporations, agencies and institutions, be they private, public or government, may contract with AEPIC to monitor performance data for a particular building, building complex, regional facility or facilities of any scale. The data is collected and stored with appropriate coding to permit analysis and monitoring. Additionally, the data, in a depersonalized form, can become part of the general data base and be of assistance to all the users of AEPIC.

Another special program within this mode is the "Building and Material Register." Owners of buildings or manufacturers of materials and products may register the building or the products to be monitored over time and record their performance history as it accrues.

Another major function of AEPIC is support for research. Schools of architecture, engineering, building construction and related disciplines, consortia and similar research groups such as the Architectural Research Centers Consortium and other private and industry research groups will find AEPIC data and library resources a vital support in their programs. The alliance between the research centers and AEPIC will be of mutual benefit to both parties. Research proposals have been presented which have included AEPIC as the primary data source and the repository to collect and analyze the research data, again in a coded format to facilitate exclusive access by the subcontractor. (See Fig. 3)

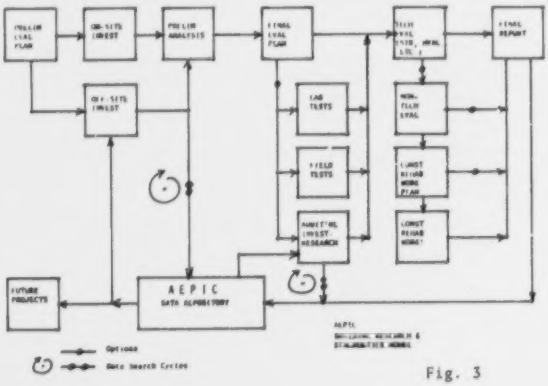


Fig. 3

AEPIC Data Research:

AEPIC will conduct no basic research: AEPIC is to be a neutral, non-biased, University-based repository of data and, as such, will not engage in basic research nor have any proprietary interest in the data which is analyzed for all users.

AEPIC will conduct research of the data in its own data base. Processing, updating, improving of in-house records and the analysis of trends and patterns in the data is the nature of research the center is obliged to conduct. The rate of change in the technologies and our society is so great that continuing research is necessary to update the instruments for reporting and recording performance data. The performance report form and the citation.form, as well as the language for KWIC, must be updated to maintain an accurate information feedback mechanism, the better to effectively reduce performance failures. In this sense, the continuing analysis by the users of data and reporters of data is vital: all become a part of the research program of AEPIC.

In addition, all users and reporters in the AEPIC program are encouraged to submit materials for the repository libraries: photographs, slides, and visual materials relating to performance problems. Current and historical codes, references, clippings, published articles and other documents related to the Center's mission are also requested.

Data Analysis:

Computer software has been developed for the analysis of AEPIC data. Some study and analysis has been completed, for example: by type of project, problem area, state and municipal distribution, and by firm type. AEPIC has classified nine basic firm types: architect, architectural engineer, civil engineer, electrical engineer, mechanical engineer, structural engineer, land surveyor, landscape architect and retired professional. Individual studies can be conducted to compare performance of "firm type" by state with "firm type" by national average. AEPIC is currently analyzing the geographical distribution of cases to determine if trends exist.

AEPIC has developed the computer programs for the analysis of trends over time. The data ranges over a claim period of 1958 to 1983. Trend analysis of all the above mentioned data could be conducted over this time period. The trend analysis (Lorentz curves) shows the rate of incidence, i.e., the percentage of claims against one group of the total claims against all groups, with the base expanded to a normalized one thousand cases per year to remove variations in the number of claims in any one year. The rate of incidence for the architect has been unchanged over the twenty-five year period. This is interesting in comparison with the data which shows that the number of claims per one hundred insured firms has increased dramatically over that same period of time. (note: Architects are involved in approximately 45% of all claims in the Victor Schinnerer data). Similar studies show a comparable lack of change for the engineering professions except for the structural engineer and the architectural engineer who show a decreased rate of incidence since 1972. In contrast, the retired professional shows a drastic increase in the rate of incidence since 1976.

It is important to note that judgments and conclusions about some data are dangerous. There is not sufficient evidence in some data to indicate why these trends occur. We can, through AEPIC data, discover the trend but additional research is frequently needed to explain some of the trends.

Other interesting studies are derived from a comparison of AEPIC/Schinnerer data with the reports of C. Roy Vince, Vice President of Architecture and Engineering Claims Division of Shand-Morahan & Company. The "Lorentz" trend analysis of the building type "factory and industrial" indicate that rate of incidence of claims against this type has declined over the past ten years. Yet, the observations of Mr. Vince indicate an increase in the severity curve for this building type over the same period. This would seem to indicate that the percentage of claims has diminished as the severity of claims has increased. Changes in method of design and construction is the reported reason for this change.

Mr. Vince also points out that over the past ten years a major change has occurred in the ranking of building types on the severity curve. In 1963, assembly buildings were high on the severity curve and in 1983 they are low on the severity curve. In 1963 industrial facilities, tunnels, bridges, dams and public buildings were low on the severity curve and in 1983 those same buildings are high on the severity curve. It is observed that changes in the construction management process and the imposition of speeded-up methods of construction have led to a lack of quality control in adapting those new processes.

Mr. Vince indicated that there is an increasing tendency in the primarily industrialized and specialized construction areas to move away from negotiation as the primary method of resolving claims. Presumably, the trend is toward litigation. It was also noted that government bodies are also learning to press claims. "Design-Build" firms and "Complete Service" firms have a frequency of claims of 250% to 300% above that of the norm. In addition to the insurance industry data, a number of other studies of performance in Europe and America has been analyzed at AEPIC. Studies of "Phase of Service to Problem Area" comparisons and variations in "phase of service" have also been conducted. From 1978 to 1983, the incidence of claims related to "Design" in the Schinnerer data was over 60% in comparison to "Construction" at over 26%. (See Fig. 4). Data from the Bureau Securitas (a French agency) provided by SOCOTEC, the American subsidiary, shows in a study of 10,000 failures from 1968 to 1978 that 37% of the number of failures were in "design" and 51% were in "construction". Data from the Bureau also indicates that 78% of design deficiencies are related to "poor or inadequate details", and that the predominant number of failures occur within the construction period and during the first year of use. Additional studies by Shand-Morahan indicate that "building failures" were the highest ranked of "severity of losses" in the past but the current trends show "economic or financial loss claims" to lead the list.

Phase of Service / Problem Area	Design	Construction	Additional Services	Study and Report Phase	Bidding	Unspecified	Total Claims in Problem Area
Site Development Construction	625 43.2%	425 29.4%	66 5.0%	89 6.2%	15 1.0%	250 17.2%	1448
Architecture	873 70.7%	307 24.9%	17 1.4%	30 2.4%	5 0.4%	3 0.2%	1235
Structural	326 61.8%	167 31.6%	4 0.8%	17 3.2%	6 1.1%	8 1.5%	528
Mechanical Electrical Environmental	777 70.2%	250 22.6%	22 2.0%	31 2.8%	16 1.4%	11 1.0%	1107
Economic	31 47%	9 13.6%	3 4.5%	13 19.7%	0 0.0%	10 15.2%	66
Overall Average	2652 60.0%	1156 26.4%	90 2.1%	180 4.1%	42 1.0%	282 6.4%	4384 100%

AEPIC DATA:
1978 - 1982

Fig. 4

It is the intention of AEPIC to create a newsletter for members to share this kind of "trend analysis" on a regular basis. Information will also be available by regular correspondence and through electronic communication, especially with the international repositories. AEPIC hopes to publish selected portions of the data analysis in the newsletter or bulletin of the professional societies. Plans are in process for the development of a "journal of performance analysis" which will emphasize the theoretical and conceptual issues of performance and performance analysis.

The Future of AEPIC & Possible Outcomes

The major thrust of activity in the immediate future will be the expansion of the reporter network. Efforts will be made to contact the components and chapters of the professional and technical organizations, and local building departments, building inspection agencies, federal agencies and others who have expressed an interest in AEPIC, to create an effective network of reporters for performance data.

Prior to the development of AEPIC, reports of performance failures were made but were, unfortunately, filed in isolated storage throughout the world. No centralized source of data on performance was available. During this next year, it is hoped that the routine operations of AEPIC will be well established at the University of Maryland and the international repositories will begin operations in several countries outside the U.S. This should lead ultimately to a diminishing rate of performance failures, fewer confrontations in the courts, an improved process in the development of codes and standards and a reduction in insurance premiums.

In the future it is reasonable to expect that the normal procedures in the process of design analysis will include a summary of AEPIC data for the building, structure and material type contemplated. For a small sum and little effort we should be able to avoid the repetition of many of the mistakes of the past.

A special request is made to all the architects and design professionals in private practice, in education, research and in the agencies and businesses:

1. Please consider joining the AEPIC activity by active membership in AEPIC and on one of the committees.

2. Please contribute your experience of performance information.

3. Please contribute to the libraries of AEPIC: The photographs and slides for the Visual Materials Library and the historical codes, standards and references for the Reference Library.

There is probably no better way to mark the observance of the 700th anniversary of the failure of Beauvais Cathedral.

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R. Randall Vosbeck, FAIA, Principal
VVKR Incorporated

DONALD W. VANNOY

Executive Director

Architecture and Engineering Performance Information Center

Dr. Vannoy received his Bachelor's degree in Civil Engineering from West Virginia Institute of Technology in 1970. He received his Master's and Ph.D. degrees from the University of Virginia in 1975. His early career was in construction and design work.

He is an Associate Professor of Civil Engineering and the Structures Technical Group Leader at the University of Maryland. Since July 1982, he has been the Executive Director of the Architecture and Engineering Performance Information Center (AEPIC). He has directed several large research projects at the University of Maryland, and he has published numerous reports and papers in the field of structural engineering. He has investigated and reported on numerous failures which relate to structural performance, and he has served as an expert witness. He is a consultant to various engineering firms in the Washington/Baltimore area.

He is a registered engineer in the States of Maryland and West Virginia, and in the District of Columbia. He is currently Secretary of the ASCE Steel Bridge Committee, and he is active on other ASCE, ACI, TRB, and ASTM committees. He is a member of the ASCE Committee which was presented the 1983 State-of-the-Art of Civil Engineering Award. He was cited by the publisher and editors of Engineering News-Record as one of those who made marks in 1983.

In addition, he is active with the National Engineering Honor Society, Tau Beta Pi. He currently serves as the Chief Advisor of Maryland Beta Chapter, and he is a member of the National Executive Council of Tau Beta Pi. He has served as the 1980-81 President of the Maryland Chapter of Sigma Xi, and he is a member of Phi Kappa Pi.

JOHN LOSS

M. ARCH. University of Michigan
B. ARCH, University of Michigan
Post-Graduate Studies at Wayne State University and University of Detroit, Detroit, Michigan; Watford Polytechnic Institute, London, England
Registration as Architect: NCARB Certificate 10382; Maryland

FIELDS OF SPECIALTY: Architectural design and planning; Architectural Technology & Structures.

CURRENT APPOINTMENTS: John Loss, AIA: College Park, Maryland. Sole practitioner, consulting practice in Performance Analysis of Buildings.

Professor of Architecture and Director, Architecture and Engineering Performance Information Center (AEPIC), School of Architecture, University of Maryland.

MAJOR PROFESSIONAL EXPERIENCE: John Loss, AIA: Annapolis, Maryland; Raleigh, North Carolina; and Detroit, Michigan. Sole practitioner; consultant design for medical clinics, shopping center, churches, offices, factories, and residences.

John Loss & Associates; Detroit, Michigan. Architects and planners, owner and principal of small office. Full design and production responsibility for several housing and urban renewal projects. Contract administration for approximately $30 million annually for Larwin - CNA Mortgage Investment Group.

Housing Systems, Inc., Michigan. Founder and owner; research and development of modular, prefabricated housing system. Mill production of panelized components with four-day assembly on site.

Leon & Loss, Architects, Detroit and Grosse Ile, Michigan. Partnership, design of church and residence.

DeVries & Associates, AIA, Muskegon, Michigan. Project manager, job captain, designer, and draftsman for varied practice.

Eero Saarinen, AIA, Bloomfield Hills, Michigan. Designer and draftsman on various industrial and commercial projects.

Gould & Moss, Inc., AIA: Plymouth, Michigan. Designer and draftsman.

City Planning Department, Muskegon, Michigan. Assistant City Planner.

ACADEMIC: Instructor, University of Michigan; Professor and Acting Dean, School of Architecture, University of Detroit; Professor and Head, Department of Architecture, North Carolina State University; Professor and Associate Dean, University of Maryland.

JOHN LOSS (Continued)

RESEARCH: Hazard Mitigation (Earthquakes & Hurricanes) NSF; Building Performance Analysis, NSF; Aging and the Environment, Gerontological Society, Washington, D.C.; Temporary Educational Facilities, American Iron & Steel Institute; Solar Energy & Housing, AIA Research Corp. & NBS.

AUTHOR: Various publications in professional and technical journals. Examples, Building Design for Natural Hazards, National Science Foundation; Portsmouth, AIA R/UDAT, Portsmouth, Virginia; Solar Energy and Housing (Mobile Homes) AIA Research Corp. and National Bureau of Standards; Temporary Educational Facilities, American Iron and Steel Institute; "Homes of Tomorrow: Solar Energy and the House", Releigh Times; etc.

LECTURER: Lecturer on architectural design, technology, and design process; numerous lectures on "Performance Analysis" and "Development of AEPIC".

HONORS: Listed in "Outstanding Educators of America", 1969; "Significant Americans of the Bicentennial, 1976"; "Dictionary of International Biography, 1977"; "Outstanding Architects in America, 1977"; "Who's Who in America, 1983-84". "Engineering News Record" (McGraw Hill): Honor in recognition of those who have served the best interests of the construction industry in 1983.

MEMBER: American Institute of Architects (AIA); Maryland Society-AIA; Potomac Valley Chapter-AIA; Association of Collegiate Schools of Architecture (ACSC); Earthquake Engineering Research Institute (EERI); Board of Directors, Architectural Research Centers Consortium (ARCC).

NEAL FITZSIMONS
Principal
Engineering Counsel

After receiving his Civil Engineering degree from Cornell University, and pursuing graduate work in structures there and at Lehigh University, Mr. FitzSimons' early career was in the evaluation, design and construction of buildings, roads, airfields, and bridges in Europe, Africa, Asia, and the United States.

Later, as an engineer on nuclear tests concerned with protection from weapons effects, he developed engineering design and construction criteria which are still widely used. This work evolved into high-level management positions involving programs of nuclear protection directed towards optimizing social, economic, and political recovery from disaster. These activities deeply involved Mr. FitzSimons in systems engineering, computers, and social science.

Mr. FitzSimons' personal practice has included such projects as foundation investigations, structural evaluations, computer technology and studies on construction products (soil stabilizers, precast concrete, etc.) and master planning (urban renewal, community and industrial development).

He has long been engaged in both research and practice which relate to structural performance. His work in this area has included many special studies for the White House, the Federal Reserve Board, other government agencies and private clients. For over two decades his professional efforts to enhance techniques in this field and historic preservation have been well recognized. He is the founder (Past Chairman) of the ASCE Research Council on Performance of Structures; Chairman of the ASCE Committee on Damaged and Failed Structures; member, ASCE Committee on Experimental Analysis and Instrumentation; member (Past Chairman) of ACI #437, Evaluating the Strength of Existing Concrete Structures; and member, ASTM Committee E-6 on Performance of Building Constructions.

In addition he is active on other professional committees such as the ASCE Committee on History and Heritage (National Chairman). He is a consultant to the Encyclopedia Britannica; author, co-author, or editor of several books; writer of more than a hundred papers; and lecturer both in United States and Europe. He is a Registered Professional Engineer in Maryland, a Fellow of ASCE and ACI, and member of other professional societies, including American Society for Testing and Materials, and the Operations Research Society of America. His military service included duty as an infantry sergeant, a medic and an engineer officer.

2: AEPIC BROCHURE

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R. Randall Vosbeck, FAIA, Principal
VVKR Incorporated

AEPIC DIRECTORS

Dr. Donald W. Vannoy, P.E.
Executive Director &
Director for Engineering

John Loss, AIA
Director Technical Services &
Director for Architecture

For additional information detach and mail form to:
Architecture and Engineering
Performance Information Center
3907 Metzerott Road
University of Maryland
College Park, Maryland 20742
(301) 935-5544

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Performance Information Center
3907 Metzerott Road
University of Maryland
College Park, Maryland 20742

AEPIC

ARCHITECTURE AND ENGINEERING PERFORMANCE INFORMATION CENTER *(AEPIC)*

AEPIC is designed to receive information on incidents involving the performance of projects, and to permit access to this information in a meaningful form in order to improve the performance of the industry in the future.

The information is structured for use by the industry in:

1. Planning new projects
2. Reviewing existing projects for rehabilitation or restoration
3. Teaching case studies
4. Modifying codes and regulations
5. Planning research
6. Preparing professional texts
7. Investigating for dispute resolution
8. Developing new products for the industry
9. Implementing effective quality control measures
10. Improving professional and industry practice
11. Creating an in-house resource base with lessons learned from project performance

In order to:

1. Improve professional practice
2. Prevent repetition of poor practice

AEPIC DATA

The type and range of data collected:

Computerized Case (Incident) File:

Professional and "informed reporter" reports on actual incidents of performance, such as water damage, masonry disintegration, structural collapse, or air pollution, etc.

Computerized Citation File:

Reference to all published information about the incidents in journals, newspapers, agencies reports, investigation reports, etc.

Dossier Library:

Documentation of performance data about the incidents and related information.

Visual Materials Library:

Photographs, slides and other visual material related to incident file.

Reference Library:

Current and historical codes, standards and other technical references.

All data can be free of sensitive, personal information to protect the privacy of individuals and firms. The data will relate specifically to performance of materials, elements, systems and processes.

AEPIC USERS

AEPIC is a centralized source of information. Architects, engineers, contractors, developers, manufacturers, lawyers, building owners and users, governmental agencies, insurance underwriters and others interested in the objectives of *AEPIC* can take advantage of a computerized collection of performance data and related information.

AEPIC SUPPORT

AEPIC is a self-supporting non-profit center. An annual membership fee in addition to a search fee is charged to maintain the data base.

Annual Membership Fees:
(By Firm Size)

1 - 4 : $100	20 - 99 : $400
5 - 9 : $200	100 - 199 : $600
10 - 19 : $300	over 200 : $800

(Other Membership Categories)

— Sponsor: $1000

— Patron: $5000

Search Fee:
The process of access to the Center's data is an annual membership fee plus a $75.00 search fee for each basic search.

For further information on the service of *AEPIC*, detach and return the enclosed form.

Membership Application (Firm Size or Membership Category: Annual Fee)

☐ 1 - 4 : $100
☐ 5 - 9 : $200
☐ 10 - 19 : $300
☐ 20 - 99 : $400
☐ 100 - 199 : $600
☐ over 200 : $800
☐ Sponsor: $1000
☐ Patron: $5000

☐ Check enclosed for $ _____ ☐ Invoice requested

Name _____ Title _____ Telephone ( )_____

Organization (if any) _____

Street Address _____

City _____ State _____ Zip Code _____

For activity interests, please complete the reverse side.

Architecture and Engineering
Performance Information Center
3907 Metzerott Road
University of Maryland
College Park, Maryland 20742

AEPIC

On which subjects/activities would you request or provide performance information?

_____

_____

Examples: bridge and highway construction; marine facilities; office or commercial development; construction, project management; surface, finish materials; soil survey; site preparation; heating; ventilation; moisture control; materials research & testing; water supply, treatment; urban planning; design; site analysis; etc.

☐ I have the following professional/technical society affiliations: _____

☐ I am interested in becoming a correspondent reporter for region/state: _____

☐ I am interested in becoming a member of the following Advisory Committees: _____

AEPIC ORGANIZATIONAL DIAGRAM

AEPIC ADVISORY COMMITTEES

- Codes & Specifications
- Education
- Insurance
- Legal
- Media
- Owners
- Professional Practitioners
- Research
- Technical

For membership on Advisory Committees, provide information on return form.

3: PERFORMANCE REPORTING PACKAGE

ARCHITECTURE AND ENGINEERING PERFORMANCE INFORMATION CENTER

UNIVERSITY OF MARYLAND

The Architecture and Engineering Performance Information Center (AEPIC) is engaged in the collection, classification and analysis of data describing problems, malfunctions and failures in architectural and civil projects, their histories and their outcomes. Two main types of information are classified: Performance Reports outline specific cases; Document Citations note published and unpublished reports, books, pamphlets or articles.

Enclosed are Performance Report and Document Citation forms. Since AEPIC data may relate to structural, electrical, mechanical, aesthetic or environmental problems, there may be incidents which do not readily fit the printed forms. In such cases, please report events in any format which accurately describes the facts. Form section numbers can be used as a format for word processor or computer drafting of Performance Reports or Document Citations. Enclose the printout, numbered to correspond to form sections, with a signed form.

Performance Report data and Document Citations carry a Reporter code number which identifies only the Reporter's professional affiliation and notes whether the Reporter has been involved with the described Performance events. "Involved" means any person with actual knowledge of events, including post-incident investigators, reconstruction and redesign personnel, as well as persons taking active part in the reported project. Such codes are intended to aid in analyzing Performance data; a Reporter's identity will not be disclosed unless the Reporter specifically consents to referrals.

Comments, suggestions or questions from current or prospective Reporters are welcome. Inquiries may be addressed to:

Accessions Department: AEPIC
Architecture and Engineering
Performance Information Center
University of Maryland
3907 Metzerott Road
College Park, Maryland 20742

35-471 O - 84 - 3

ARCHITECTURE AND ENGINEERING PERFORMANCE INFORMATION CENTER
PERFORMANCE REPORT

AEPIC, University of Maryland
3907 Metzerott Road
College Park, Maryland 20742
(301) 935-5544

PART A: REPORTER, ACCESSIONS DATA

A110 This form is intended for a full description of a specific Architecture or Engineering problem.* Because Performance Reports can focus on structural, electrical, mechanical, environmental or aesthetic functions, some categories of data may be inappropriate or unavailable for any one Report. Please add new categories if needed to better describe events reported.

A115 Form section numbers can be used as a format for word processor or computer drafting of Performance Reports. Enclose the printout, numbered to correspond to form sections, with a signed form.

A120 Investigative documents and other relevant reports, photographs, diagrams, or other materials should be enclosed with the signed form.

A121 Please note here documents, reports, photographs, etc., which are not enclosed, but which have been prepared in connection with the Reported Performance.

A122 _____
A123 _____

A130 **Questions:**

A131 Have you performed any services in connection with this Reported Performance?

A132 Are you willing to be contacted by *AEPIC* on this matter?

A133 May *AEPIC* refer other persons to you for information regarding this matter?

A140 **REPORTER** (A business card may be attached in lieu of writing name, etc.)

A150 Name _____
A155 Address _____

A160 Phone _____
A165 Occupation _____
A170 Registration/Licensure _____
A175 Professional Affiliation _____
A180 Present Position _____
A185 Organization _____

A190 Date this Report _____
Signature _____

*An *AEPIC* Document Citation form is used to report published and unpublished articles, reports, etc. for bibliographic data collection.

***AEPIC* use only**

_____ accession number
_____ reporter code

acknowledge _____
log, inventory _____
cross reference _____
code _____
enter _____
file _____
update _____

Inventory-Repository Reference

R010 Report Form

R020 Test Reports

R030 Investigation Reports

R040 Drawings

R050 Photos

R060 Slides

R070 Contracts

R080 Litigation, arbitration docu.

R090 Judicial Opinions

R100 Settlement documents

R110 Published articles

R120 Keywords:

aepic pr 14 84 feb

PART B: PROJECT IDENTIFICATION & DESCRIPTION	Notes for Reporters
B200 TERMINOLOGY:	200 Technical or professional reference for terms used by Reporter; examples: CSI, ASTM, NSPE, AIA, NFPA, etc.
B210 PROJECT NAME, FUNCTION	210 Full project name, number designation, if any. Specify use if not obvious from name.
B220 LOCATION	220 Address for buildings; for other projects, nearest place, milestone, river, topographic feature. Give State if U.S.A.
B230 OVERALL PROJECT SYSTEMS, MATERIALS	230 Describe project structural systems, construction type, structural, finish materials.
B240 OVERALL PROJECT DIMENSIONS	240 Describe size by dimension appropriate to project: length, width, stories, span, square feet, meters, height, etc. Use approximate measure if no exact size known.
B250 PROJECT DATES, COST	250, 255 Date begun, completed; original cost; changes, reason, dates. Use range if no exact date. Costs as known; approximate or estimate if unknown.
B255 ALTERATIONS DURING OR SINCE CONSTRUCTION	260 Describe part, system, subsystem, component, space or area, of project directly involved in problem events.
B260 COMPONENT(S), ELEMENT(S) INVOLVED, MATERIALS	270 See 240. Dimensions may be noted on sketch in Part D.
B270 COMPONENT, ELEMENT DIMENSIONS	280 Specify loads, pressures, forces, temperature and weather conditions. Note accumulations, impact, vibrations, etc.; designate factors as typical, unusual or extreme.
B280 CONDITIONS, AGENTS, CATALYSTS	285 Specify contracts, codes, laws relevant to problem. Note whether allegedly violated, possibly applicable, violation established, etc.
B285 CONTRACTS, CODES, LAWS	290 List proprietary or generic type of product, transport, erection or fabrication equipment, tools involved. Listed items need not be the cause of the problem, but can be part of a remedy or repair procedure. Use Part C to describe use or function of listed items.
B290 EQUIPMENT, PRODUCTS, TOOLS	295 Unspecified data: Notes of experimental nature of systems, materials, components used, nonstandard applications, unusual conditions, etc.
R295 SPECIAL FACTORS	

PART C: PERFORMANCE EVENTS, ANALYSIS, CONCLUSIONS AND RECOMMENDATIONS	
C300 DESCRIPTION OF EVENTS:	**Reporter's checklist for Part C** (Data of special importance to *AEPIC* are in **bold type**.) ____ Date, timespan of reported events; year, month or season if no date known. ____ Stage or phase of Project; construction, survey, design, occupation, alteration, etc. ____ Signs, conditions, precursors, warning signs, accompanying factors. ____ Observed events, dates and timing, discovery, diagnosis, **initial remedial measure.** ____ Role or title of persons involved, in whose employ; "involved" includes all those taking part or affected, including the discoverer of errors, agent of repair, or victim. ____ Results: injuries, deaths, economic losses, time out of service, demolition, etc. ____ **Replacement, repair, reconstruction, problem solution.** ____ Estimate of actual total losses due to problem malfunction, failure. ____ Progress of legal proceedings, if any, or other dispute resolution process. ____ Outcome; settlement or allocation of duties, repair, payments, damages.
C310 ANALYSIS:	____ Analyses, investigations performed; by whom: reporter, investigator, government official, etc.
C320 CONCLUSIONS:	____ Apparent or established major cause or last agent, factor or error. ____ Apparent or established contributing agents, factors or errors; specific acts or omissions, missing information, unknown facts, miscommunication, noncommunication.
C330 RECOMMENDATIONS:	____ Overall recommendations. **Proposed act or conduct which would have avoided problem or lessened severity.** ____ **Proposed changes in practice or procedure to incorporate lessons in quality assurance industry-wide.** aepic pr34 84 feb

PART D: SKETCHES, KEYWORDS, COMMENTS

D410 Caption:

D420 Scale:

D430 Keywords: (List the most descriptive words related to the event.)

D440 Comments, postscripts:

ARCHITECTURE AND ENGINEERING PERFORMANCE INFORMATION CENTER
DOCUMENT CITATION

DOCUMENT: ***P100*** Published _____ Unpublished _____ material*

P110 TITLE _____

P200 AUTHOR(S) _____

P300 SOURCE, PUBLISHER _____

P400 PUBLISHER CITY, STATE _____

P500 PERIODICALS:
P510 DATE _____ ***P520*** VOL _____ ***P530*** NO _____
P540 PAGES _____ to _____
P600 BOOKS, PAMPHLETS, SERIALS:
P610 DATE _____
P700 SERIES TITLE _____

P800 EVENT DATE or TIMESPAN: _____

P820 ABSTRACT (Contents, coverage, conclusions; note if photocopy enclosed.)

P850 KEYWORDS (List the most descriptive words related to the event.)

P900 **REPORTER** (A business card may be attached in lieu of writing name, etc.)
P950 Name _____
P955 Address _____

P960 Phone _____
P965 Occupation _____
P970 Registration/Licensure _____
P975 Professional Affiliation _____
P980 Present Position _____
P985 Organization _____

P990 Date this Report _____

Signature _____

*An *AEPIC* Performance Report form is used to describe a specific Architecture or Engineering problem for case report data collection.

AEPIC, University of Maryland
3907 Metzerott Road
College Park, Maryland 20742
(301) 935-5544

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_____
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Document Source: DS __ __ __
Document Type: DT __
Document Class: DC __ __ __
Quick Codes:
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__ __ __ __ __ CSI ref. no.
__ __ __ __ __ CSI ref. no.
QL __ __ LOCATION
QP __ __ PROBLEM
QU __ __ OVERALL PROJECT USE
QS __ __ PROJECT SIZE
QC __ __ COMPONENT INVOLVED
QM __ __ MATERIALS/TYPE
QY __ __ YEAR
QT __ __ TIMESPAN/MONTH
QD __ __ DEATHS
QI __ __ INJURIES
QR __ __ CATALYST/RESULT
QO __ __ OUTCOME/COST
QF __ __ CENTRAL FACTOR

Keywords

aepic dcll 84 feb

4: ARTICLES ON AEPIC
(PARTIAL LIST)

20/20 Hindsight with the Aid of a Computer

The world's first computerized archive of data on structural failures is helping engineers learn from the mistakes of others. In addition, the press is finding it a source of technical data for their disaster coverage.

By Donald W. Vannoy, P.E.
Director
Architecture and Engineering
Performance Information Center

Providing engineers and architects with "20/20 hindsight"—the ability, in short, to learn from past experience—is the goal of the newly established Architecture and Engineering Performance Information Center (AEPIC) at the University of Maryland in College Park. AEPIC, the world's first computerized archive of data on structural failures, has been funded for two years by the National Science Foundation, and has as its sole purpose the collection, analysis, and dissemination of information on the performance of architectural and engineering projects.

Professional engineers and architects have a duty, as have other professions, to keep themselves informed of developments relevant to the conduct of their profession. The performance of this duty requires that, among other things, they should learn from experience.

The study of failures is an essential part of this learning process. It provides a feedback to the professions that is needed—both because of the changes that constantly are occurring in the society the profession aims to serve, and because of developments and changes in technology and practice. To be of practical use, information gathering on failures needs to be on a continuing basis so that trends may be identified and so that ap-

propriate avoiding action may be taken without undue delay. It is this need for continuous feedback that AEPIC seeks to fill.

Background

The concept of an engineering performance information center was first proposed to the American Society of Civil Engineers (ASCE) in 1964, but it was not given formal recognition as a potential ASCE program until August 1968. By 1977, enough interest had been generated within ASCE to request and receive a modest research grant from the Federal Highway Administration to study the feasibility of such a center. The resulting research report, issued in 1979, (1) summarized past, present, and future sources and users of information; (2) evaluated the potential of a center as a focus for activities to collect and disseminate knowledge and experience gained from structural failures and their prevention; and (3) proposed an organizational structure for both the data and the center.

Between 1979 and 1981, discussions were held with the American Society for Engineering Education and George Washington University to encourage the submission of a request to the National Science Foundation (NSF) to establish a prototype center. Although a draft proposal was prepared for each organization, no formal submission was made by either.

In May 1981, under the sponsorship of the National Capital Section of ASCE, with funds provided by Victor O. Schinnerer & Co., an insurance underwriter, an international meeting was held in Washington, D.C., to reach an accord on what information should be recorded for each case to be included in the data base. In addition, meeting participants reviewed the proposed organizational structure for a future international cooperative network of data repositories, and agreed to help promote the plan in their own institutions.

After this meeting, the University of Maryland took the leadership in preparing a proposal for an NSF grant. During its preparation, it was decided to have the School of Architecture join with civil engineering in the program.

NSF subsequently awarded the university $73,839 to fund AEPIC for one year beginning July 1, 1982. (A second grant of $76,534 was given by NSF in July 1983 to fund AEPIC's second year.)

The 100-foot section of the Interstate 95 bridge in Greenwich, Conn., which collapsed in June 1983. (AP Photo)

AEPIC Today

AEPIC is designed for architects and engineers to efficiently retrieve information on incidents involving the performance of projects for which they are responsible as conceivers, planners, designers, constructors, operators, or investigators.

The information is structured for use in:

- Planning new projects;
- Reviewing existing projects for rehabilitation, re-use, remedial work, or restoration;
- Teaching case studies;
- Modifying codes and regulations;
- Planning research;
- Preparing professional texts;
- Investigating for negotiations, arbitration, or litigation proceedings; and
- Developing new products.

It is hoped that the information will be used both to improve professional practice, as well as to prevent the repetition of poor practice.

Organization

The University of Maryland serves as the International Center of AEPIC, as well as one of AEPIC's regional repositories. A number of other regional and international repositories eventually will be set up to broaden the base of AEPIC users and contributors.

A nine-person Advisory Board has been appointed to provide guidance on AEPIC policies and

Media Turns to AEPIC for Answers

When the Architecture and Engineering Performance Information Center (AEPIC) was formed a little over a year ago, its founders envisioned it serving as a design-planning resource for architects and engineers. Then came the collapse of the Mianus River bridge on I-95 near Greenwich, Connecticut, last June. That's when the media became important AEPIC users.

"We got calls from CBS News, *The New York Times*, and several Connecticut newspapers," says Donald Vannoy, director of AEPIC. "They wanted to know about various types of bridge construction, and about the construction of the bridge that collapsed. They also wanted to know about bridge failures—what bridges had failed in the past and what had caused the failures."

Thanks to information on file at AEPIC, Vannoy was able to tell the reporters that there have been 30 bridge failures in the past ten years, only one of them because of the bridge's design. (Ships hitting bridges were responsible for 13 of the collapses; another 13 bridges collapsed during construction; and three of the collapses were due to "questionable" causes, according to Vannoy.)

The I-95 bridge incident caused Vannoy and AEPIC's advisory board to think that the center "could serve as a valuable resource to the media" to provide technical information on such failures. To coordinate this role, Vannoy is assembling a new AEPIC Media Committee, consisting entirely of news media representatives, who will assist in AEPIC's contact with news organizations. Among those who already have agreed to serve on the committee are some of the reporters Vannoy assisted on the bridge story.

Vannoy emphasizes that AEPIC's role as a media resource will be strictly limited to providing technical information and, when possible, historical information on similar incidents. "We don't want to get in the position of speculating on the reasons for the failure of a structure," he stresses. "We just want to make sure that reporters have the best technical information available on the kind of structure they're talking about in their stories."

programs, and to review the center's technical operations. NSPE member Albert W. Knott, owner of a respected testing laboratory, serves on the board, as do representatives selected for their expertise in the insurance, law, architecture, contracting, and consulting engineering fields.

While the Advisory Board is AEPIC's primary policy-making body, the Advisory Council and Advisory Committees are the primary link to establishing the center's major professional, agency, and media user networks. Approximately 150 representatives of technical and professional organizations currently serve as AEPIC advisory council members. Their function is twofold: to disseminate information on AEPIC within their organizations, and to encourage their organizations' members to contribute information to the AEPIC data base. David Lillard has been appointed to represent NSPE's Professional Engineers in Private Practice division on the AEPIC Advisory Council. An engineer with Black and Veatch of Kansas City, Mo., Lillard is chairman of PEPP's Professional Liability Insurance Committee.

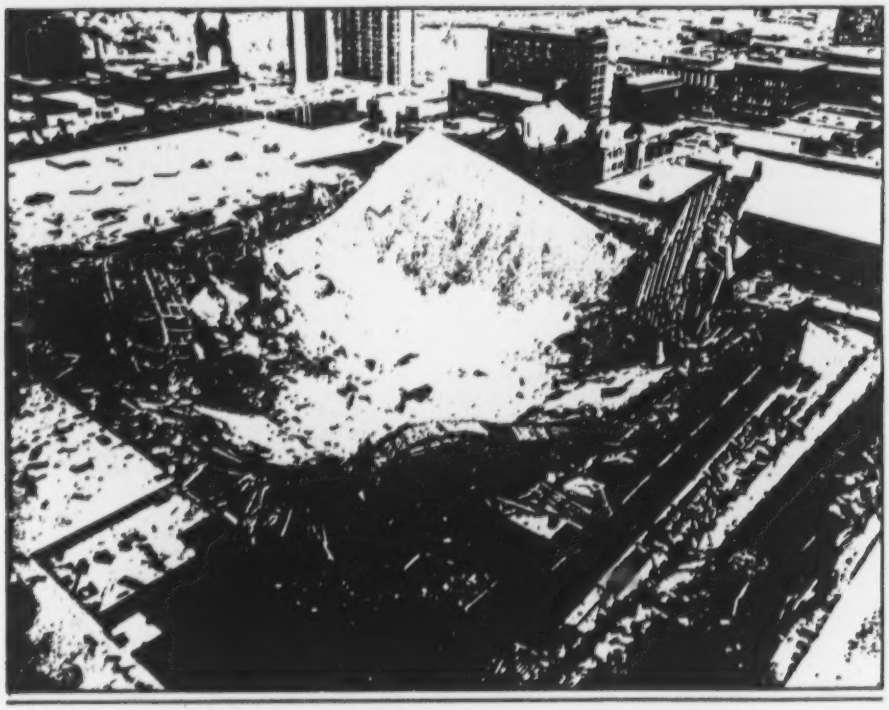
Data are the vital core of AEPIC—data that are relevant, accurate, and, especially, accessible. The data will come into the center in many forms and will be classified, coded, and indexed before going into their proper files, electronic or manual. (See figure.) All computer-based files will be coded for security, and all access to the computer-based material must go through security control. Thus, needs for anonymity in sensitive data will be satisfied.

AEPIC Data

All data in the AEPIC base will relate specifically to performance of materials, elements, systems, and processes, and will be "laundered" of sensitive, personal information to protect the privacy of involved individuals and firms. The range of data collected will include:

- *Computerized Case (Incident) Files:* Professional and "informed reporter" reports on actual incidents of performance, such as water damage, masonry disintegration, structural collapse, or air pollution;
- *Computerized Citation Files:* Reference to all published information about the incidents in journals, newspapers, agency reports, investigation reports, etc.;
- *Dossier Library:* The documentation of performance data about the incidents and related information;
- *Visual Materials Library:* Photographs, slides, and other visual material related to the computerized case file; and
- *Reference Library:* Current and historical codes, standards, and other technical references.

Users of AEPIC will pay a still-to-be-determined annual subscription fee, and will be charged a user fee for each search of the system. Subscribers will be given a "password" that will enable a direct search of AEPIC's computerized files. This service is expected to be available to engineering firms and other users after January 1, 1984, following completion of the necessary software development.



The roof of the Hartford, Conn., Civic Center sports arena collapsed after a heavy load of sleet, snow, and rain accumulated on it. (AP Photo)

AEPIC currently is collecting cases from various sources, and over a period of time will become a comprehensive, centralized source of information on architecture/engineering performance. Already, AEPIC research has developed several statistical incident-analysis techniques that may prove useful to the professions.

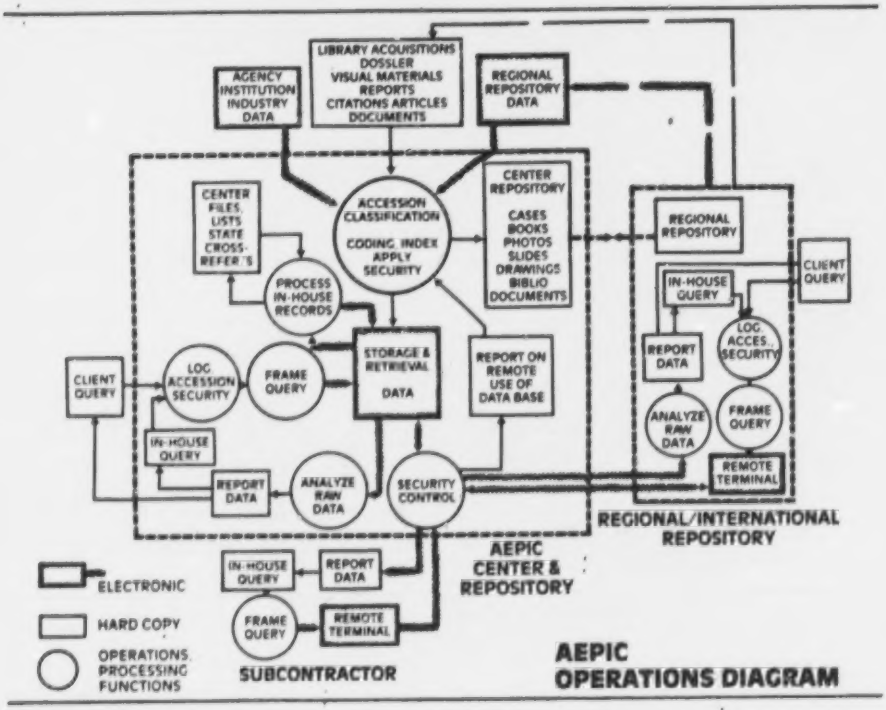
While some 450 architectural and engineering firms have offered to support AEPIC and provide case information for its data base, the major contribution to the effort so far has come from Victor O. Schinnerer & Co., which has donated information on 36,850 claims to the AEPIC archives. This contribution has been essential to the establishment of the center.

Varying Analyses

Analysis of the Schinnerer cases has been done by firm type, and also by state or major municipality. AEPIC has been able to classify the data into nine firm types: architect, civil engineer, combined A/E, mechanical engineer, structural engineer, land surveyor, landscape architect, electrical engineer, retired professional, and "other." In addition, the data can be looked at individually by state or municipality. The variation of claims by firm type by state compared with the national average also can be assessed. AEPIC currently is analyzing the geographical distribution of the cases to determine if trends exist.

AEPIC also has developed a method for reporting the incidence of certain types of claims over a period of time. Between 1958 and 1982, for example, claims against architects have been filed fairly consistently, regardless of a fluctuating total construction volume. Claims against structural engineers have been drastically reduced since 1973; claims against retired professionals have dramatically increased since 1976.

AEPIC data also can be broken down into project type and problem type: data for approximately 40 project types and 30 problem types can be generated. The discovery of a sharp increase in reports of structural problems during the construction phase begin-



AEPIC OPERATIONS DIAGRAM

ning in 1978 has led AEPIC to conduct research to determine the reasons for the increase. Studies such as this will help provide needed feedback to architects and engineers.

Next year will be a notable one for AEPIC. By then, it is hoped that routine operations of the center will be established at the University of Maryland, and AEPIC repositories will begin at other institutions outside the U.S. If successful, the next decade will see not only a direct improvement in the performance of the design professions, but also the concomitant reduction in confrontations associated with deficient performance. When the inevitable failure does occur, at least the costs of the technical support of the case will be lessened.

There is another aspect of AEPIC that may have an impact on future cases. Until its establishment, there was no centralized source of information on A/E performance. Consequently, deficient performance, even if reported in the literature, was often unnoticed by the everyday practitioner, who then unwittingly may have designed a structure with the same inherent defect.

Once AEPIC is fully operational, it is expected that many practitioners will include, as a routine part of the planning phase, an AEPIC report on the type of structure they will be undertaking. For a very reasonable sum they will be able to ensure that past errors will not be perpetuated by them. It is hoped that this one simple step will have a discernible, positive effect on future projects. pe

(Material in this paper was presented at the conference on Construction Failures: Legal and Engineering Perspectives, *sponsored by the American Society of Civil Engineers and the American Bar Association in October.)*

NSPE members are encouraged to contribute to AEPIC's data collection efforts by submitting to the center's archives reports on personally known cases of engineering failures.

Further information, as well as forms for reporting failure incidents, can be obtained by writing Donald W. Vanoy, P.E., Director, AEPIC, 3907 Metzerott Rd., University of Maryland, College Park, Md. 20742.

Establishing statistical patterns of building failures can help engineers and architects prevent similar failures in the future and also reduce litigation. AEPIC in Maryland is doing just that. But it needs all engineers to participate in the program if it is to succeed.

NEAL FITZSIMONS
DONALD VANNOY

ESTABLISHING PATTERNS OF BUILDING FAILURES

In July 1981 a structural failure in Kansas City killed one hundred and fourteen people and thrust the design professions once again into the media spotlight. The drop in public confidence of the design professions was as precipitous as the fall of the walkway.

As with all preceding structural failures the same question arose, "What is being done about preventing future failures?" Two months before the Kansas City collapse Neal FitzSimons[1] presented a paper to ASCE called "Making Failures Pay." In it he said "each (failure) can contribute to the advancement of civil engineering just as every medical postmortem can contribute to the advancement of medicine. The problem has been in the establishment of a system to perform structural 'post mortems' and to diffuse the knowledge gained." The establishment of AEPIC is being undertaken by the profession to minimize the scope and severity of structural failures and to concomitantly improve the practice of structural engineering.

One year after the Hyatt Regency tragedy, the doors opened on the Architecture and Engineering Performance Information Center at the University of Maryland.

BACKGROUND OF AEPIC

The concept of an engineering performance information center was first proposed to ASCE in 1964. By 1977 enought interest had been generated within the Society to request and receive a modest research grant from the Federal Highway Administration to study the feasibility of an EPIC program. When issued in 1979 the report 1) summarized past, present, future sources and users of information; 2) evaluated the potential of a Center as a focus for activities to collect and disseminate knowledge and experience gained from structural failures and their prevention; and 3) proposed an organizational structure for both the data and the Center.

Between 1979 and 1981 discussions were held with the American Society of Engineering Education to encourage the submission of a request to the National Science Foundation to establish a prototype center, to write the necessary computer programs for data processing, and to develop the necessary descriptors and coding for data.

In May 1981, under the sponsorship of the National Capital Section of ASCE and with funds provided by the Victor O. Schinnerer Company, an insurance underwriter, an international meeting was held in Washington, D.C. to reach an accord on what information should be recorded for each case that is to be included in the data base. In addition, the participants reviewed the proposed organizational structure for a future international cooperative network of EPIC repositories and agreed to help promote the plan in their own institutions.

After this meeting the University of Maryland took the lead in preparing a proposal for a National Science Foundation grant. During its preparation it was decided to have the School of Architecture join with Civil Engineering in the progam and the National Science Foundation reached an

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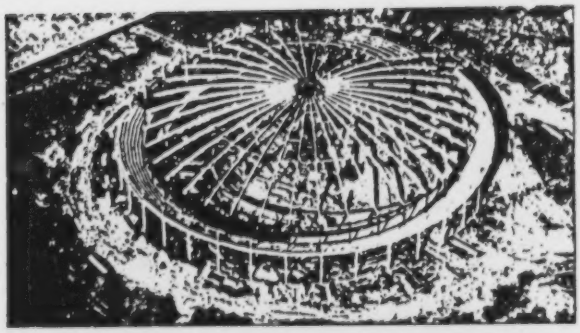
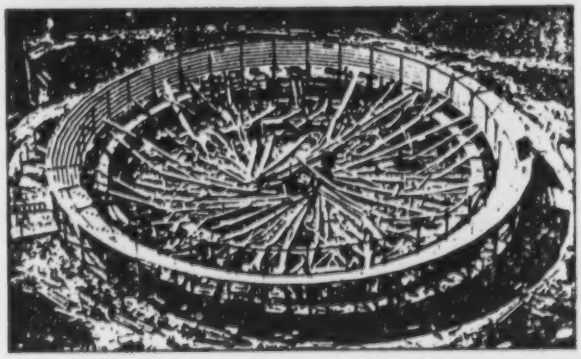




Photos in AEPIC files showing erection and collapse of a dome structure during construction.

agreement with the University which became effective on July 1, 1982. A temporary center was dedicated on July 26th, and a few months later the University of Maryland dedicated the present building as the AEPIC center. The first meeting of its Advisory Board was held there on January 26, 1983, and the Second International Conference was held on June 26-28, 1983. A report on the Second International Conference was featured in the October 1983 issue of CIVIL ENGINEERING magazine.

FUNCTIONS OF AEPIC

AEPIC is designed for architects and engineers to efficiently retrieve information on incidents involving the performance of projects for which they are responsible as conceivers, planners, designers, constructors, operators or investigators.

The information is structured for use in: 1) planning new projects; 2) reviewing existing projects for rehabilitation, re-use, remedial work or restoration; 3) teaching case studies; 4) modifying codes and regulations; 5) planning research; 6) preparing professional texts; 7) investigating for negotiations, arbitration or litigation proceedings; 8) developing new products for the construction industry. This information will help to improve professional practice and prevent repetition of poor practice.

ORGANIZATION

The University of Maryland is the International Center of AEPIC as well as one of the repositories of AEPIC. A network of international repositories will be set up to broaden the base of users and reporters. Early formation of the Advisory Board was essential and the first meeting was held January 26, 1983.

Advisory Committees interact with AEPIC and the varied users of the data which will be collected by the Center. The name to the committees implies their broad interest. These are:

Program Advisory Committee: Architectural, engineering and construction practitioners and other users.

TechnicalAdvisory Committee: Technical organizations with specialized interests such as NIA, PCA, ACI, NCMA, AAMA.

Codes and Specifications Advisory Committee: BOCA, UBC, SOUTHERN, ACI, AISC, AIA, professional firms, industry.

Education Advisory Committee: Academic staff and associations.

Insurance Advisory Committee: Insurance organizations and agencies.

Legal Advisory Committee: Legal societies, firms and practitioners.

Media Advisory Committee: Professional/technical journals; special interest news media and general news media.

Research Advisory Committee: Architecture, engineering, construction, research organizations; private and public agencies and universities such as ARCC, HBS, UM, ACI, AISC.

The Advisory Council and the Advisory Committees are the primary link to the major professional societies and media user networks. Membership appointments on the Council and Committees were inaugurated in the fall of 1983. However, civil engineers are encouraged to contact AEPIC if they are interested in serving on any of the committees.

COLLECTION OF DATA

The vital core in AEPIC is accessible data; data which is relevant, accurate and accessible. The data enters the center in many forms and, after appropriate classification, coding and indexing go into its proper files (electronic or manual). The computer based files are properly coded for security and all access to the computer based material goes through security control. Thus, anonymity in sensitive data is maintained. The "client query" is fundamentally the same whether it be an individual client, a subcontractor, an in-house query or a request from a repository.The major functional difference is the "security control" applied to all remote terminals which access the center's storage data.

Forms for reporting cases and incidents can be obtained from AEPIC by writing to: AEPIC, 3907 Metzerott Road, University of Maryland, College Park, Maryland 20742.

The range of data type will be as follows:

Computerized case (incident) file: Professional and "informed reporter" reports on actual incidents of performance, such as water damage, masonry disintegration, structural collapse, or air pollution, etc.

Computerized citation file: Reference to all published information about the incidents in journals, newspapers, agencies reports, investigation reports, etc.

Dossier library: The documentation of performance data about the incidents and related information.

Visual materials library: Photographs, slides and other visual material related to incident file.

Reference library: Current and historical codes, standards and other technical references.

Architects and engineers are encouraged to submit photographs, slides and other visual material on performance problems. What better way to teach case studies, seminars, or undergraduate/graduate courses than to have a complete visual materials library? With a national repository of visual materials, members of ASCE can request from AEPIC examples of various types of failures to use in preparing lectures or other types of presentations.

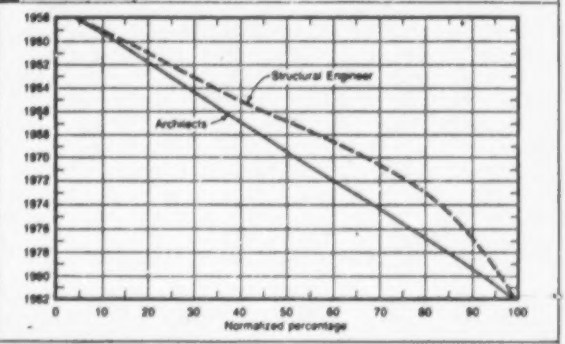
Other data collected by AEPIC are current and historical codes, standards, and other technical references. In investigating failures or doing rehabilitation work, the design professional is often confronted with searching for old codes and standards. AEPIC has established a national repository for collecting these materials. Anyone wishing to donate material for this effort should contact AEPIC. (AEPIC is a non-profit organization and the donation of material is tax deductible.)

WHAT CAN AEPIC DO FOR YOU

The eight functions of AEPIC were described above, but there is even another aspect of AEPIC that may have an impact on you in future cases. Until its establishment, there was no centralized source of information in A/E performance. Consequently, deficient performance, even if reported in the literature, may remain unnoticed by the everyday practitioner and he may unwittingly design a structure with the same inherent defect that caused the deficiency. Once AEPIC is fully operational, it is expected that many practitioners will include, as a routine part of the planning phase, an AEPIC report on the type of structure they will be undertaking. For a very nominal sum they will be able to insure that past errors will not be perpetuated by them. A fee to do a search of the AEPIC data base will be approximately $100.

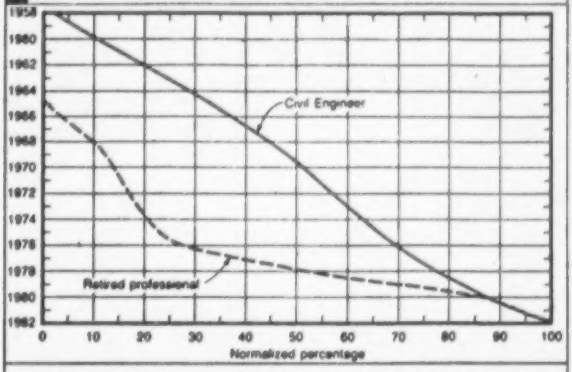
In addition, AEPIC repositories have been started in Canada and Great Britain for the first foreign repositories. Additional foreign repositories are being established. If AEPIC is successful, the next decade will see not only a direct improvement in the performance of the design professions, but also the concomitant reduction in confrontations associated with deficient performance. Further, if a failure does occur, at least the time and costs of the associated investi-

FIGURE 1
CLAIMS: STRUCTURAL ENGINEERS & ARCHITECTS



A double normalized graph of cumulated claims versus time (Lorenz curve based on 1,000 records by year, i.e., relative frequency of occurrences per 1,000 records)

FIGURE 2
CLAIMS: CIVIL ENGINEERS & RETIRED



A double normalized graph of cumulated claims versus time (Lorenz curve based on 1,000 records by year)

gation of the case will be lessened.

TRENDS—AND FEEDBACK TO THE PROFESSION

As stated, AEPIC is currently collecting cases of performance, and over a period of time will become a comprehensive centralized source of information in architecture/engineering performance. Already, AEPIC research has developed several statistical incident analysis techniques that may prove useful to the professions.

Several groups have donated blocks of data to AEPIC. One group has donated information on 15,000 roofing failures. Another group, Victor O. Schinnerer and Company, Inc., has donated information on 36,850 claims. Confidentiality of the claims have strictly been maintained, and only the technical information has been provided to AEPIC. These major contributions are an essential element to the establishment of AEPIC. A statistical analysis of some of this data has been conducted by AEPIC.

A double normalized diagram of cumulated incidents versus time has been developed by AEPIC for the reporting of statistical incident analysis (three figures are presented here). Figures 1 and 2 are curves for architect, structural engineer, civil engineer, and retired professional. These curves illustrate trends in the data. When the curve approaches horizontal slope, it means that there is an increase in the number of claims against the firm type. If the curve approaches vertical slope, it means a decrease in claims against the firm type.

A few observations can be made by examining these curves. The curve for architects is approximately a 45 degree line, which means that since 1958 they consistently have claims filed against them regardless of the fluctuating total construction volume.

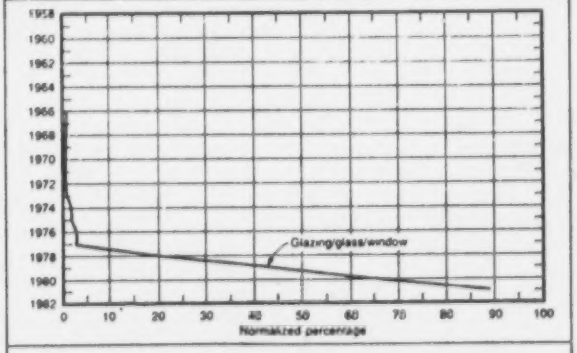
The curve for structural engineers is drastically reduced beginning in approximately 1973. AEPIC is currently conducting research to look at variation in data for all the curves to determine causes of these trends. The curve for civil engineers is more fluctuating with time.

An interesting curve from analysis of the data is the retired professional. Until 1976, the curve is basically approaching the vertical. Since that time, there is a drastic increase in number of cases against the retired professional.

The data can also be broken down into *project type* and *problem type*.

AEPIC is able to generate data for approximately forty. Figure 3 illustrates the *problem type* "glazing/glass/windows." AEPIC is currently conducting research to determine the reason for their sharp increase in 1978, and why the number of cases have been increasing. Studies such as this should provide needed feedback to the design profession. AEPIC is able to generate data for approximately thirty problem type areas.

FIGURE 3
CLAIMS: GLAZING/GLASS/WINDOWS



A double normalized graph of cumulated claims versus time (Lorenz curve based on 1,000 records by year)

LESSONS TO BE LEARNED

As an example of feedback to the profession, if the data indicates a large number of failures in a particular system (glazing/glass/window, exterior wall, etc.) the common factor can be determined and the solution to the problem to prevent its recurrence can be published. AEPIC plans publication of a newsletter, which outlines such problems as they are being reported to the repositories. In addition, AEPIC is establishing an editorial board for the publication of a *Journal for Performance Analysis: Buildings and Civil Structures*. This journal will contain, among other things, detailed case studies in various problem areas.

An editorial in the July 5, 1982 issue of *Engineering News-Record* stated that ". . . AEPIC will never amount to much unless people take the trouble to contribute to it. Volunteer labor has brought it this far. National Science Foundation money will pay the bills for the shakedown years. User fees will keep it going after that. But what AEPIC needs more than anything else is experience, solid construction experience, the kind of experience that leaves you shaking your head and swearing that you'll never do that again." C

REFERENCES

1. FitzSimons, Neal, "Making Failures Pay", ASCE Preprint 81-093, American Society of Civil Engineers, New York, New York, May 1981.

Donald Vannoy, M. ASCE, is associate professor of structural engineering at the University of Maryland's School of Civil Engineering and is head of their structures department. He has a Ph.D. in civil engineering from the University of Virginia and is co-director of AEPIC.

Neal FitzSimons, F. ASCE, is a principal of Engineering Counsel in Kensington, Maryland, and chairman of the AEPIC Advisory Board. He is also chairman of the ASCE Engineering Performance Information Committee.

NEWSBREAK

Center Makes Available Data on Performance of Structures

By mid-1984, almost two years after it was created, the Architectural and Engineering Performance Information Center (AEPIC) at the University of Maryland, College Park, Maryland, will make publicly available a data base on the performance of structures.

"The center will be a repository of data on the performance of buildings and civil structures with the ultimate goal of improving their design, construction and performance," says John Loss, a professor of architecture, who co-directs the center with Donald Vannoy, a professor in civil engineering. The center is the only one of its kind in the world, although repositories for performance information are being developed in foreign countries, especially Canada and the United Kingdom, Loss says.

The 1973 Skyline Towers collapse.

Specifically, the AEPIC will collect, collate, analyze and disseminate data to potential users such as architects, engineers, contractors, developers, manufacturers, lawyers, building owners, insurance underwriters, and federal and state agencies, he explains. Data may deal with the structural, electromechanical, functional, aesthetic or environmental performance of materials, elements, systems and processes.

Data are collected with a performance report and document citation forms, which were developed in cooperation with professional organizations, architectural/engineering firms, and federal and state governments. The reports will relate actual incidents of performance, such as water damage, masonry disintegration, structural collapse, or air pollution, Loss says. Citation forms will collect references to information about the incidents in journals, newspapers, agency and investigation reports.

The center will also establish a Dossier Library, which will contain documentation of performance data about incidents and related information. Also planned are a Visual Materials Library with photographs and slides related to the incidents recorded in the files and a Reference Library with technical references such as current and historical codes and standards, according to Loss.

The data on the performance report will come in from respondents with specific names and building information. However, the center will use its code and classification system to prevent identification of actual buildings and persons involved in their design, construction and ownership, says Loss.

Confident of Response

Loss is confident he will have a good response. Already the center has on file 40,000 incidents or cases supplied by the insurance industry and the staff has developed the computer software necessary for analysis. "After we have mailed the forms the number of cases could easily reach 500,000 within a year," he says. Loss emphasizes that the center will only be dealing with "research of data" to maintain its neutrality. "AEPIC is to be a neutral, non-biased, university-based repository of data," he explains, "and as such we will not engage in basic research or have proprietary interest in the data that we are attempting to analyze for all those users."

In this function, the center should have a positive impact. "Primarily through the availability of data relating to the performance of buildings and civil structures can we prevent continuing failures," Loss says. Primarily concerned that the data are meaningful for and thus of benefit to the users, Loss asked members of the industry and government for their help in refining the drafts of the reporting forms. He also hopes that membership organizations will help in the development of a taxonomic thesaurus and a classification system by providing a current list of words and definitions used in a specific profession. "We deliberately do not want to develop a new language," he says. "Instead, we want to use a language with which individual reporters are most familiar."

Among the documents to be used in the development of the thesaurus are the Construction Specifications Institute

MASTERFORMAT, the American Institute of Architects Standard Form of Agreements, and the glossaries of the Masonry Institute and the Aluminum Manufacturers, Loss says. The computer will then cross-reference the terms for greater accuracy and consistency.

To ensure better contact to potential users, AEPIC has asked industry membership organizations to designate a liaison to be on the AEPIC Advisory Council. Participation of interested individuals is encouraged in eight advisory committees, which are expected to be formed by spring. These include a "program" committee for practicing architects and engineers, a technical and a legal committee, and committees on codes and specifications, insurance, research, education and media. The staff of the center has also appointed an Advisory Board to help AEPIC in national end international matters.

Financial Support

Access to the data base will cost a fee similar to those charged by subsidized data bases, although the AEPIC base will not receive government funds, Loss says. He estimates a search might cost between $100 and $150, although the price has not been finalized at this writing.

Instead of government support, Loss hopes companies, agencies and membership organizations will make annual contributions as sustaining or patron members. An early contributor is Victor O. Schinnerer & Co., a program administrator for professional liability insurance programs who has pledged to donate $5,000 annually. The center was started with a $156,000 grant from the National Science Foundation and has received support from the University of Maryland and Sperry Univac, which donated the computers.

Loss is confident he will get the necessary support, because he says he feels a consensus has been reached that something needs to be done to prevent further failures. For more information, contact AEPIC at (301) 935-6544. □

35-471 O - 84 - 4

AEPIC Spells Performance

Staff

As of the first of this month, engineers can learn to dodge the bullet of performance failure simply by becoming a member of the Architecture and Engineering Performance Information Center (AEPIC) at the University of Maryland. The Center's long-awaited opening has been heralded by many members of the A/E community as a step toward reducing performance failures, a stand that is taken not surprisingly by one of its directors, Donald W. Vannoy.

A Duty to Perform

"Professional engineers and architects have a duty, as have other professionals, to keep themselves informed of developments relevant to the conduct of their profession," says Vannoy, a civil engineering professor who devotes much of his time to the new organization. Indeed, AEPIC provides a base from which to study what he sees as an essential part of the professional's learning process — construction failures.

A National Science Foundation grant breathed life into AEPIC July 1, 1982. Since then a staff of seven has been building an information base, readying themselves for the January opening when members will be given access to thousands of bits and pieces of information relating to the performance picture. Currently, this information includes abstracts from Victor O. Schinnerer Company, an insurance underwriter; books and other hard copies; and more than 2000 case studies. And that base should grow considerably as the Center and its network become more popular. A major part of that network, says Vannoy, will be regional reporters who will funnel information to the Center. Other major contributors will be the repositories located in Canada and Great Britain, insurance underwriters such as Victor O. Schinnerer, and local chapters of professional associations such as NSPE, AIA, ACEC, and CSI.

Still, the Center's backbone is the private practitioner who is expected to become a major contributor of information. All the practitioner has to do, explains Vannoy, is to request a report form, fill it out, and return it to the Center. And that same practitioner, he adds, may someday be able to access the Center's information banks with his personal computer. What he will get in return is information that, among other things, is structured for use in planning new projects, reviewing existing projects, and planning research.

A Small Price to Pay

The cost to access the Center's memory banks is a $100 annual membership fee for individuals. Actual information retrieval, however, will cost slightly more, anywhere from $25 for an ordinary search to $100 for a complicated one. The search is conducted by employing a keyword or several keywords. The results are sent in abstract form to the requester, who then can ask for additional information.

But AEPIC, viewed correctly as a gigantic A/E library, does more than disseminate information to A/Es. That same information — all of which remains confidential to AEPIC and its users — also might be important to contractors, developers, owners, manufacturers, lawyers, government agencies, and insurance people, explains Vannoy. The Center also will run probability curves on codes, design drawings, specification of products, shop drawings, and change orders. Some of that research, he adds, will appear in a newsletter that is distributed to all members.

The Center currently shares a university computer for its data storage and retrieval. But if all goes according to plan, it will have its own in the near future. Also part of that plan is for practitioners to include a Center report as a routine part of their planning phase. "For a nominal sum," says Vannoy, "practitioners will be able to ensure that they do not perpetuate past errors."

For more information write to AEPIC, University of Maryland, College Park, Maryland 20742. ΔΔ

5: COVERAGE OF AEPIC ACTIVITIES
(PARTIAL LIST)

United States of America

Congressional Record

PROCEEDINGS AND DEBATES OF THE 97th CONGRESS, SECOND SESSION

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House of Representatives

OUR AGING AND DECAYING INFRASTRUCTURE

HON. STENY H. HOYER

OF MARYLAND

IN THE HOUSE OF REPRESENTATIVES

Tuesday, August 17, 1982

● Mr. HOYER. Mr. Speaker, recently a major news magazine spotlighted the problems of our aging and decaying infrastucture. Our highways, sewage systems, dams, and Government buildings, built in the 1950's and early 1960's to last 20 to 30 years, have reached their points of no return, and major rehabilitation efforts must begin or our towns and cities will face major hazards.

As we begin to rebuild our structures, it becomes extremely importance to recognize how they can be better engineered. To this end, I am pleased to announce that what is believed to be the world's first repository for data on collapsed or damaged structures is being established at the University of Maryland at College Park, with the help of a $73,839 grant from the National Science Foundation (NSF).

By 1984, architects and engineers will be able to find information on collapsed or damaged buildings, bridges, roads, and dams at the new facility, named the Architecture and Engineering Performance Information Center (AEPIC).

A joint project of the College of Engineering and the School of Architecture, the center will be codirected by Dr. Donald W. Vannoy, associate professor of civil engineering, and Prof. John Loss, associate dean of the School of Architecture.

Previous attempts to document and analyze structural deficiencies have been tied to isolated incidents or handicapped by poor recordkeeping. The chief advantage of the new center is that soon architects and engineers can benefit from a comprehensive collection of data on many types of failures—from the collapse of the Teton Dam in June 1976 to the collapse of Kansas City's Memorial Arena 3 years later.

All structural failures—from something as catastrophic as the collapse of the balconies in the Kansas City Hyatt Regency to something as relatively minor as the premature wear and tear of a rural bridge—have at least one very important point in common from which valuable information can be gathered, analyzed, and reported, according to Dr. Vannoy. The objective at AEPIC is to learn from these common points so that structural design can be improved to prevent future disasters.

Too often it is only the dramatic cases of total building collapse which receive attention. One of the primary goals of the AEPIC Center will be to investigate secondary design flaws—flaws found in exterior walls, for example, and in roof decks. This is critical, as these are the flaws responsible for a majority of building failures.

More than 2,000 examples of reported building failures are already stored in the center's data bases, and many more thousands of citations should be available to researchers and Government agencies by 1984.

In addition to establishing its own data bank and reference library, the center will serve as a prototype for repositories in universities and institutions, worldwide. Dr. Vannoy and Professor Loss already have corresponded with interested representatives from more than 14 American, British, Canadian, Swiss, and Italian professional organizations.

Initial support of AEPIC has been expressed by the American Institute of Architects, the American Society of Civil Engineers, the Federal Highway Administration, and Victor O. Schinnerer and Co. of Washington, D.C.

Mr. Speaker, I think that the center will prove to be a valuable tool in constructing the America of tomorrow. It will undoubtedly be an asset to our community and to our county.●

News and Commentary Of the Profession . . .

Engineering T

Volume 4, No. 9 — Published by the National Society of Professional Engineers

30,000 Case Studies

Structural Failure Info Compiled on Computer Base As Design Aid For A/E Firms

World's First

By Kathryn W. Hickerson
Staff Writer

What is believed to be the world's first repository for data on structural failures has been established at the University of Maryland, College Park, with the help of a $75,839 grant from the National Science Foundation.

The new Architecture and Engineering Performance Information Center (AEPIC) eventually will contain information on some 30,000 examples of engineering and architectural failures—from relatively minor problems such as leaking exterior walls to major disasters such as the recent collapse of the balconies at the Kansas City Hyatt Regency Hotel.

Donald Vannoy, an associate professor of civil engineering at the University of Maryland and co-director of AEPIC, believes the information contained in the new center's data bases will be particularly valuable to practicing engineers and architects. "If they're planning to build a certain type of structure, they can obtain information from AEPIC on failures in structures of that type," he says. "The information they find should give them a good idea of what not to do."

Previous attempts to document and analyze structural deficiencies of buildings, roads, bridges, or dams

(Turn to page 6.)

Marshall Fund Aids U.S./German Environment Study

NEWS BRIEFS

Recent Pentagon initiatives in space have raised congressional concern over NASA's civilian status.

(See story on page 6.)

The House Appropriations Committee is pressuring the Pentagon to pursue claims against engineers and architects for alleged negligence in the design of military projects.

(See story on page 11.)

The Administration's proposal for reauthorizing the Clean Water Act stresses more 'realistic' timetables, more state control, and more funding stability.

(See story on page 11.)

Two bills before the Senate seek to attract precollege science and math teachers through low-cost loans, tax credits, and other incentives.

(See story on page 5.)

Soviet Bloc countries are expected to reach a 10-fold increase in their nuclear electric generation by 2000, says Los Alamos study.

(See story on page 11.)

Firms Plan To Increase Research Spending

Four out of five industrial companies plan to intensify research efforts over the next five years and two-thirds will boost investments in laboratories, according to a recent survey of 81 companies in various industries.

The survey, conducted by facilities design firm Haines Lundberg Waehler, found that changing technologies and aging facilities are "among the

How To Market Remote Sensing

Landsat's Future Cloude Questions of U.S. Supp And Foreign Competiti

By Paul Karoff
Staff Writer

Ten years ago NASA launched an amazing new satellite to do remote sensing of the earth from space. Since then, the space agency's highly successful Landsat program has been continually refined, culminating in the launch last July of a remote-sensing satellite of an entirely new generation.

Today NASA's remote-sensing program offers valuable graphic images of the earth's surface to a wide array of government and private users for such diverse applications as agriculture, mineral development, and city planning.

Now the government says it wants to get out of the remote-sensing business. The idea of transferring the program to the private sector has been embraced by both the Carter and Reagan administrations. But there are a number of problems.

Many in the satellite field are warning that unless the problems are resolved and the Landsat program finds a secure home soon, it will be too late—too late, they say, because remote-sensing technology is already being aggressively pursued by government-subsidized entities in several Western nations.

The current Landsat dilemma revolves around the basic policy question of whether remote sensing should be offered as a government service or whether the technology is best suited to commercial enterprise. The problem of what to do with Landsat also stems from a stipulation written into NASA's 1958 charter that the agency will concentrate strictly on developmental R&D, and not mature, operational programs. Landsat is on the verge of being—some maintain already is—an operational system.

The Reagan Administration has proposed temporarily moving Landsat over to the Commerce Department, which already operates several weather and other low earth-orbit satellites. But funds to do that have not

'Considerable Doub

In its recent report policy and applications, fice of Technology As cluded that "the future ian satellite land remot considerable doubt." W any specific recomme OTA report suggests th is decided, the question solved with dispatch."

"By inaction, we onl the lead built by our sci gineers and funded b ers," says Sen. How (D-Nev.), who recentl legislation that woul "phased-in approach mercialization" of Lan

The solution conta non's bill is to immedi ground station and da segments of the system sector, while retaining of the satellites in the p probably at Commerce' Atmospheric Administr

Such an approach m a variety of reasons, th tant being a general c the earth and satellite e program together coul profitable for many ye

"Landsat has a long fore a non-governmen make it into a successf venture," says Vladimi an economist with Sa Engineering, a Washi ing firm. Naleskewicz a private interest "w spend a great deal of m not only in engineerin marketing and packa into a much more sale it's in now."

There are a number ing Landsat, to date th advanced remote-sen white elephant," acc leskewicz. First, unlik

Computer-Based Failure Info

(Continued from page 1)

have been tied to isolated incidents or handicapped by poor record keeping, Vannoy says. The chief advantage of the new center is that architects and engineers can benefit from a comprehensive collection of data on many types of failures.

Another exciting use for the data contained in the system could be the use of failure "case studies" in engineering schools, Vannoy says. "A professor could present students with an actual case of failure. They, in turn, could analyze what went wrong, and why. It would be a valuable addition to textbook teaching."

Studies of the information in AEPIC's data base also could give an indication of building code changes that need to be made, or of research that needs to be done on ways of improving certain types of structures, Vannoy believes.

Insurance companies, which have been involved in providing data to AEPIC, probably will be users of the system, as well. Studies of failure rates could be used, Vannoy says, to help determine liability insurance costs for certain types of engineering projects.

The Victor O. Schinnerer Company, a major insuror of A/E firms, has offered AEPIC access to all its claim data on structural failures—amounting to some 3000 examples in the past year alone. "Schinnerer's contribution is going to be immensely helpful in developing a large body of solid information for AEPIC users," Vannoy says.

Plans for AEPIC call for a central headquarters (at U. Md.), with regional repositories eventually located throughout the U.S. and in the capital cities of several foreign countries. Each repository will provide access to AEPIC's data, and will be able to add data to the system on examples of local and regional performance failures.

The center will be a nonprofit organization, sustaining itself after the first two to three years of operation through minimal fees charged to users for obtaining its information. Growth of the initial data base (now containing some 2000 examples of structural failures) will be dependent on contributions of information from engineering firms, insurance companies, and the network of AEPIC repositories.

The idea for a system such as AEPIC has been brewing for many years, beginning as early as 1968, when the ASCE Research Council on the Performance of Structures suggested a feasibility study on establishing such a center.

The study was begun in 1977 and issued in 1979. An international conference to discuss the project was held in May of 1981, resulting in enthusiastic support for the concept from a number of foreign countries.

A final proposal for the establishment of AEPIC at U. Md. was submitted to NSF late last year. The center is a joint project of the U. Md. College of Engineering and the School of Architecture.

Engineering and architectural firms interested in using AEPIC's resources or contributing information to its data bases are urged to contact Donald Vannoy, Department of Civil Engineering, University of Maryland, College Park, Md. 20742, (301) 454-2441.

ASCE News

SEPTEMBER 1982/VOL. 7, NO. 9

News Supplement to Civil Engineering-ASCE
American Society of Civil Engineers • 345 East 47th Street • New York, N.Y. 10017

Architecture, engineering and insurance professions are cooperating in tackling real-world performance problems with built facilities. Proof is this photo showing representatives of the three groups, from left: Ed Mariani, national director of American Institute of Architects; Spigg Duvall, head of Victor Schinnerer Co., a top insurer of A-E firms; Bill Maguire of insurance firm CNA; and John Wiedeman, president-elect of ASCE. The specialists gathered in July at dedication of Architecture and Engineering Performance Information Center at University of Maryland's engineering school. A big boost in getting Center started came shortly after the dedication when Schinnerer Company contributed key data on some 3,000 claims filed in 1981.

Congress Urges A-Es to Learn From Mistakes: Start Is Made in That Direction With Opening of Failure Center at U. of Maryland

Two separate occurences — similar in content but geographically distinct — dovetailed recently, both adding fuel to the fire that there is much to learn by documenting past errors. In the halls of Congress in Washington, D.C., a subcommittee heard testimony leading to a recommendation that engineers and architects could learn a great deal by studying their colleagues' mistakes. And on the University of Maryland campus, representatives of the design profession (including ASCE President-Elect John Wiedeman) were on hand for a ribbon-cutting ceremony marking the opening of a new archive dedicated to aiding engineers architects and others in learning about others' bad experiences with various kinds of structures and materials.

Looking for Reasons

In last month's House panel session, A-Es were urged by many of those who testified that they set up a system aimed at preventing future errors by intensely studying those that have occurred in the past. The Science and Technology subcommittee was looking into reasons for such failures as the collapse of a pedestrian walkway at the Kansas City Hyatt Regency hotel and the roof of the Civic Center in Hartford, Conn.

(Continued on page 9)

Northeastern Claims Status — For the Six

Will any student chapter ever break the seemingly endless string of victories that has placed the Northeastern University Student Chapter at the top of the heap for the last half-dozen years? According to a reliable source, the scramble for the 1982 Robert Ridgway Award was extremely close this year. In fact, for the first time the Committee on Student Services publicized its choice of top "finalists" in the annual competition to select the premier student chapter. But when all was said and done, it was eminently clear that Northeastern had not lost its winning form. The spirit that keeps it in top form from year to year seems to be intact.

Any Student Chapter seeking to emulate the winning ways of the Northeastern students need only peruse the group's most recent annual report (upon which selection of the Ridgway Award recipient is based). The report details the past year's well rounded program of technical and social events. But especially impressive is the description of the Chapter's community service program. Each year a search committee methodically seeks out organizations in the Boston area that might benefit from the Chapter's knowledge gained on earlier successful projects.

New Board Officers Installed Next Monti

Ten new members of the Society's Board of Direction will be installed next month in New Orleans when the terms of some current directors and vice presidents come to an end. More than 40,000 members voted in this year's election, which culminated on August 16, the deadline for receipt of ballots at ASCE headquarters.

Moving into the President-Elect slot

Four Receive

...CE Publications

...e list for ASCE publications will be in ...increased approximately 20% over 1982 ... and — in seven journals — increased ...on retitled to better describe their con...racter and prestige. Journals will look ...he journal name printed in appropriate ...ed Councils have not been changed.

	ASCE Members	Foreign Postage	Single Issue
	—	$ 7.00	$ 6.00
	$ 18.80	$ 8.00	$ 6.00
	$ 23.80	$ 8.00	$ 7.00
	$ 30.00	$ 7.50	$ 9.00
	$ 10.00	$ 4.00	$11.00
	$ 26.00	$ 4.80	$14.00
	$ 15.00	$ 3.00	$ 9.00
	$ 11.80	$ 2.80	$10.00
	$ 10.80	$ 2.00	$ 9.00
	$ 10.80	$ 2.00	$ 9.00
	$ 9.80	$ 2.00	$ 9.00
	$ 10.00	$ 2.00	$ 9.00
	$ 9.80	$ 2.00	$ 9.00
	$ 7.80	$ 1.00	$13.00
	$ 9.00	$ 1.00	$17.00
	$ 6.80	$ 1.00	$13.00
	$210.00	$24.00	—
	$ 13.80	$ 4.80	$ 9.00
	$ 15.00	$ 1.80	—
	$ 16.00	$ 2.00	—

...d is all ASCE member and nonmember subscrip...ns. ENGINEERING magazine, which is received as ...ange applies to subscriptions sent outside of the

...t. ENGINEERING magazine as part of their mem...p-member rate

...ployment conditions and compensa...on. Publication of *Manual 55 ...uide to Employment Conditions ...r Civil Engineers)* in 1975 placed ...CE in the vanguard of profes...sional societies who addressed these ...oblems. But, while some members ...ve asked that even more be done, ...ciety actions have been opposed ...other concerned members as in...propriate, and many legal and ...dosophical questions have been ...ised. An interesting and informa...e discussion is anticipated with ...th sides of the controversy ...presented.

The Committee on Employment ...nditions (COEC) is sponsoring ...s session. Participating, in addi...n to the keynote speaker, is the ...airman of ASCE's Committee on ...ngineers in Government, Tom ...therford; former COEC Chair...an Phil Dinauer; and younger ...mber James Hippa.

...ailure Center

(Continued from page 1)

Architects testifying said Congress should provide legislation permitting A-Es to defer taxation of revenue set aside to help pay for the defense of liability suits. According to Jerome M. Cooper, the American Institute of Architects: "Design professionals now anticipate that they will become involved in litigation whenever there is a building failure, regardless of the apparent cause of the time elasped since services were last performed on the project." He said claims against architects and engineers had increased from 36% in 1978 to 45% in 1980. A subcommittee staff investigation found that architects, engineers and builders were increasingly restricting their activities to the letter of contract as a way of avoiding legal liability.

In other testimony, an executive of a firm offering A-E liability insurance said that "structural failures occur from a common repeated cause." Roy Vince, vice president of architects and engineers claims for Shand, Morahan & Company, Inc., Evanston, Ill., said serious structural failures "occur at random but are statistically predictible." The effect of serious structural failures on insurance loss ratios does not affect the insurance industry's ability to offer needed protection to design professionals," he said. In fact, "the insurance specialty market is expanding to broaden the protection it is offering to include other construction-related coverage." For example, Shand, Morahan recently introduced a policy for constructors' errors and ommissions to cover faulty workmanship.

As to claim frequency, architectural and structural engineering firms both fall near the norm, Vince said. Architects, however, have a relatively small incidence of catastrophic loss. The incidence of such losses for structural engineers is somewhat higher. In terms of comparison, structural engineers have a frequency rate about 5% lower than all insured design professionals and a severity rate about 15% higher than this insurance classification. These overall studies indicate that those disciplines whose experience would normally be skewed by serious structural failures, are, in fact, experiencing higher severity rates "but not to the point that they cannot be dealt with in the ordinary course of the insurance process," Vince added. (Design construct, complete service firms and structural engineers all fall into this category.)

Repository for Failure Information

The House panel chairman, Rep. Albert Gore, Jr., Democrat of Tennessee, said he would introduce a bill to establish a federal repository of information on structural failures.

...Air Force Seeks Closer Ties with Engineering Groups

A closer association between the defense establishment and professional engineering societies in the United States is being fostered by Air Force Secretary Verne Orr. Meeting at the Pentagon last May with Dr. Robert B. Gaither, president of the American Society of Mechanical Engineers, Secretary Orr agreed that a mutual relationship would benefit both the engineering community and the military. As a result of that get-together, Orr wrote to senior commanders in the Air Force, encouraging both engineering officers and civil servants in their commands to join appropriate national engineering societies. He reminded the commanders that since October 1981 the Air Force Institute of Technology has 900 fully-funded quotas available each year for military engineers and scientists to attend civilian professional development conferences.

In another letter to heads of the major engineering societies (ASCE among them), Secretary Orr urged them to consider initiatives such as dues reduction for junior officers and lower-grade civil servants as an inducement for joining their respective societies. He also urged the joint development — on a local level — of military-private sector-sponsored conferences.

But as of late July, such a clearinghouse already exists. To be funded by the National Science Foundation for at least the first two years of its existence, the Architecture and Engineering Performance Information Center (AEPIC) has its first official home on the Maryland campus. Longtime active member Neal FitzSimons has been in the forefront of ASCE members who pushed for the permanent establishment of the failure center, which was first proposed in 1964. Donald W. Vannoy, associate professor in the University of Maryland's CE school, will operate the center jointly with John Loss, associate dean of the school of architecture. AEPIC will cover all bases — not just major failures but minor ones as well. Information is being stored in citation files (brief information on problems) and case history files (containing detailed information). AEPIC will also contain a dossier library containing newspaper clippings, investigation reports and other information on particular failures. Anyone wishing more information — or to contribute to AEPIC — can contact Donald Vannoy, CE Department, University of Maryland, College Park, MD 20742.

...r Students Held at 7 Sites

...Re: Design Firm ...

BIOMEDICINE

Arthritis drug retreats under fire

A drug for reducing pain and inflammation due to arthritis has been removed from the market indefinitely by its manufacturer only three months after it was approved by the Food and Drug Administration. Oraflex, also called Opren and benoxaprofen, has properties similar to those of aspirin, but is taken less often. On Aug. 5, Richard S. Schweiker, Secretary of Health and Human Services, announced that Eli Lilly and Co. had "agreed to voluntarily suspend its sales and distribution of the anti-arthritic drug Oraflex." The drug had been banned in Britain earlier that day for a three-month period of evaluation. Oraflex had been linked to 61 deaths there, mostly among elderly patients. There have also been reports of more than 3,500 cases of adverse reaction in Britain, where the drug has been sold for two years. The British Committee on the Safety of Medicines told the FDA that it was concerned about toxic effects on the gastrointestinal tract, liver, bone marrow, skin, eyes and nails. The FDA now is investigating 11 U.S. deaths that may be associated with the drug.

A Lilly statement maintains that, even though the company is voluntarily suspending worldwide distribution of Oraflex, it believes the drug is safe and effective when used properly. It cites extended clinical trials involving about 4,000 subjects. The first deaths associated with the drug were reported in Britain in May, less than a month after the U.S. approval. Because the British deaths all occurred in elderly patients receiving the maximal recommended dosage of Oraflex, Lilly revised its labeling and sent letters to U.S. physicians emphasizing that elderly patients should be started on a lower dose of the drug. Several organizations, including Ralph Nader's Health Research Group, urged that Oraflex be taken off the market as "an imminent hazard" and they brought a suit in federal court. At a recent congressional hearing, FDA officials were criticized for not being aware of some of Oraflex's side effects, such as jaundice, at the time it approved the drug. The FDA is currently investigating whether Lilly was delinquent in its reporting of side effects.

Interferon blocks cold virus

A British medical team has reported evidence that a nose spray containing interferon produced by genetic engineering can prevent at least one type of common cold. The preliminary study appeared in the July 24 LANCET. Geoffrey M. Scott and colleagues of Medical Research Council Common Cold Unit in Salisbury, England, showed that 19 volunteers who used the nasal spray remained cold-free after they were exposed to rhinovirus type 9, a virus responsible for about 25 percent of colds in adults. Eight of 22 control subjects developed colds after they were given a placebo nasal spray and exposed to the virus.

This study is not the first to show interferon's effectiveness against cold viruses, but previous work used interferon derived at great expense from human cells. Scientists weren't sure whether the interferon produced by genetically engineered bacteria would work on the cold virus, but Scott's results indicate that it did.

George J. Galasso of the National Institute of Allergy and Infectious Diseases in Bethesda, Md., says that because synthetic interferon works against rhinovirus type 9 he expects that it will work on other cold-causing viruses as well.

Galasso says the researchers don't know whether interferon can be used to treat people who already have a cold. He says that interferon, which has no observable side effects when used as a nasal spray, might eventually be used by surgery patients, the elderly or others who might develop serious health problems if they were to catch a cold. He says an interferon nose spray might also be useful to parents who want to avoid catching the latest cold their kids bring home from school.

TECHNOLOGY

A matter of gravity

High school and college physics students, past and present, may remember trying to measure the acceleration due to gravity, *g*, by timing a pendulum or a freely falling object. If they were lucky, the answers were close to 9.8 meters per second per second. The National Bureau of Standards can do a little better with a new, portable instrument that provides an accuracy of 6 parts in 10^9—enough to detect the change in *g* over a vertical height of 2 centimeters.

The instrument is a modified optical interferometer in which one of the mirrors is allowed to fall. In an interferometer, light of a particular wavelength travels from a source along two different paths by way of mirrors and then recombines to form a pattern of light and dark fringes. Any slight change in one path length causes the fringes to shift. Thus, a falling mirror will generate a rapidly shifting pattern of light that can be detected photoelectrically. In the NBS instrument, about 600,000 fringes flash by the detector in 20 centimeters of free-fall. The crossing time for every twelve-thousandth fringe is carefully measured and stored in a computer, which can then calculate *g*. The measurement is closely tied to the international standards for time and length.

James E. Faller of the Joint Institute for Laboratory Astrophysics in Boulder, Colo., says one of the unique features of the instrument is that measurements can be repeated in a short time to obtain a large number of data points. "It is nimble, quick, light and mobile," he says. Although the complete instrument weighs about 400 pounds, it's a considerable improvement over previous kinds of apparatus for determining the absolute gravitational acceleration. A small van can move it easily.

Faller says the apparatus will be useful for measuring the effects of long-term geophysical processes and for calibrating gravimeters, which measure the relative pull of gravity. Five copies of the prototype instrument are now being built for use by several international groups involved in geophysics research. Faller says, "I hope that after several years one will not only know that it really works and what its problems are, but also have a good measure in a number of geophysically different cases of how valuable this new data type is."

Failures and other building problems

What caused the Teton Dam collapse in June 1976 or glass panels from the John Hancock building to smash onto Boston streets? Information about these and other collapsed or damaged structures is difficult to locate, even for architects and engineers. The University of Maryland at College Park is now establishing the first repository for data on the performance of structures, from the collapse of the walkways in the Kansas City Hyatt Regency Hotel (*SN*: 3/6/82, p. 149) to the premature wear of a rural bridge.

Donald W. Vannoy, co-director of the new Architecture and Engineering Performance Center, says the data bank will initially focus on building performance, but may eventually expand into other areas of engineering such as machinery. The objective is to be able to learn from these problems to improve structural design and prevent future disasters, he says. Anybody, for a fee, will have access to the stored data. Vannoy expects that architects and engineers will request information when they are designing something they've *never* designed before. Insurance companies, law firms and government agencies would also find performance data useful.

The National Science Foundation has provided $73,839 to get the project started, but Vannoy says the program should be self-supporting once a sufficient data base is collected. The center may serve as a prototype for similar data repositories elsewhere in the world.

DISCOVER MAGAZINE
OCTOBER 1982

In the News

Data Bank on Failures

Spurred by tragedies like the collapse of walkways at the Kansas City Hyatt Regency Hotel, which killed 114 people in July 1981, the University of Maryland has established a bank of technical data on building and structural failures. The aim is to help engineers and builders prevent similar catastrophes.

The bank will collect information about significant structural failures in bridges, dams, and roads, as well as buildings. "Every building failure represents an unplanned experiment," says engineering professor Donald Vannoy, 34, co-director of the project with John Loss of the university's school of architecture.

With National Science Foundation money, the Architecture and Engineering Performance Information Center—custodian of the bank—is gathering records from insurance companies, engineering and architectural firms, government agencies, contractors, and news and scientific organizations. A Washington insurance firm has agreed to donate its file of 40,000 cases.

Among the major failures Vannoy cites as incentives for starting the data bank were the 1976 Teton Dam collapse in Idaho, roof cave-ins at the Hartford (Connecticut) Civic Center coliseum and Kansas City's Kemper Arena in 1978 and 1979, and the Hyatt Regency accident.

But small structural failures, such as cracked foundations and leaking walls, will constitute most of the center's data. "For every big incident, there are a thousand small ones that probably cost more money but don't make the news," Vannoy explains. When the project becomes self-supporting, possibly by 1984, anyone with a computer terminal will be able to tap the center's resources by telephone for an hourly fee. The center will even collect information about foreign structural and engineering failures, which date at least from the time that Pisa's famous tower began to lean.

Doomed Grebes

Just how much punishment can a vanishing species of waterfowl take before becoming extinct? The question may soon be answered for the Atitlán grebe of central Guatemala. As if the partial destruction of its habitat by the 1976 earthquake and by recent construction were not enough, the flightless giant

The Atitlán grebe

pied-billed grebe, whose only home is Lake Atitlán, in the highlands west of Guatemala City, is now bereft of the devoted game warden who protected it for 14 years.

The warden, Edgar Bauer, was killed during the political conflict in Guatemala last May, and because of the unstable political situation he is not likely to have a successor. According to the Smithsonian Institution, Bauer was personally responsible for rebuilding the rapidly receding reed beds near Santiago Atitlán, the sole breeding and nesting refuge for these birds. The Atitlán grebe declined in population from 230 in 1976 to about 60 in 1980, and without protection it will become extinct within the next five years.

The Big Wheel Spins

By studying the magnetic fields of distant galaxies, British radio astronomer Paul Birch, a graduate student at the University of Manchester, has deduced that the universe may be rotating. At the rate he estimates, one complete cosmic turn would take about 60 trillion years—some 3,000 times the present age of the universe.

To reach his surprising conclusion, Birch studied the orientations of 94 galaxies that emit radio energy. On radio maps such galaxies often look like dumbbells, each with a small, powerful central source flanked by two large lobes emitting radio waves. The lobes are thought to be caused by beams of high-energy particles continuously shooting in opposite directions from the central galaxy. Birch found that in many galaxies the lobes have become bent slightly into S shapes. The direction of bending of a galaxy's radio lobes, clockwise or counterclockwise, seems to depend on where the galaxy is in the sky. In one half of the sky as seen from earth, the vast majority of radio galaxies are truly S-shaped, while in the other half most appear to have been bent the other way, like Z's. The young astrono-

Lobby of the Hyatt Regency Hotel in Kansas City after the walkways collapsed

Cumberland, Md.
AUG 7 1982

National Data Bank On Building Failure Set Up At University

COLLEGE PARK, Md.(AP) — In an effort to prevent future disasters like the collapse at the Kansas City Hyatt Regency, the world's first repository for data on damaged buildings, bridges, roads, and dams is being established at the University of Maryland.

The Architecture and Engineering Performance Information Center will enable architects and engineers to study a collection of documented structural failures prior to designing new projects, according to John Loss, one of the center's directors.

Previously, attempts to analyze structural failures have been hampered by poor record keeping.

Donald Vannoy, another director, said the center's primary goal will be to study past mistakes in order to prevent future tragedies.

"Every structural failure — from something as catastrophic as the collapse of the Teton Dam in 1976 to something as relatively minor as the premature wear and tear of a rural bridge — represents an unplanned experiment from which valuable information can be gathered and reported," Vannoy said.

The center has more than 2,000 cases of structural failures on fde and many more reports will be available by the center's opening in 1984.

The program is being funded with a grant from the National Science Foundation.

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Building collapses to be studied

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Evening Capital
Annapolis, Md.

AUG 6 1982

Data on structures compiled

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Post
Frederick, Md.

AUG 5 1982

Repository could avert disasters

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THE EVENING SUN, Thursday, August 5, 1982

Building data compiled

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From staff and wire reports

PRINCE GEORGE'S
THE Journal
Prince George's County's Daily Newspaper
WEDNESDAY, AUGUST 4, 1982

Jniversity's Crash Course Digs into Building Disasters

y BOB GREENLEE
ournal Staff Writer

The world's first disaster bank is coming to he University of Maryland.

A computer catalogue of collapsed buildings, rumbled dams, and damaged bridges will be athered as a step to make future buildings afer.

The research project will be conducted at the Jniversity of Maryland College Park campus vith the help of a $73,839 grant from the Na- ional Science Foundation.

At the Architecture and Engineering Perfor- ance Information Center, to open in 1984, ar- hitects and engineers can review a compre- ensive collection of failures.

Among the disasters detailed will be the col- apse of the Teton Dam in June of 1976; the col- apse of Kansas City's Memorial Arena in 1979; he collapse of the roof of the Hartford Civic Center in 1978; the collapse of the Skywalk in he Hyatt Regency Hotel in Kansas City, only ast year.

AEPIC, a joint project of the College of Engi- eering and the School of Architecture, will be o-directed by Dr. Donald Vannoy, associate rofessor of civil engineering, and Professor ohn Loss, associate dean of the school of rchitecture.

Loss said AEPIC is "an idea that has been round for several decades, but it's the first ime we've been able to pull all the pieces to- ether for such an undertaking.

"In the past," he added, "there was no open ublic access to the data on structural failures. We have individual cases as they occur, but no entral location where this data can be xamined."

Previous attempts to analyze structural deficiencies have been tied to isolated incidents or handicapped by poor record keeping.

Vannoy noted, "All structural failures - from something as catastrophic as the collapse of the balconies in the Kansas City Hyatt Regency to something as relatively minor as the premature wear and tear of a rural bridge - have at least one very important point in common from which valuable information can be gethered, analyzed, and reported. Our objective at AEPIC is to learn from these common points so that we can improve structural design and prevent future disasters."

In addituon to Loss and Vannoy, AEPIC will have as a consultant Neal PitaSimons, a principal owner of Engineering Counsel in Kensington. Loss said, "He's been involved in this activity for about 25 years - in the study of building failures."

The AEPIC center at the University of Maryland College Park campus will be the prototype of centers that will be established elsewhere around the country, according to Loss.

He added, "Too often it is only the dramatic cases of total building collapse which receive attention. One of the primary goals of the AEPIC Center will be to also investigate secondary design flaws - flaws found in exterior walls, for example, and in roof decks. This is critical, as these are the flaws responsible for a majority of building failures."

More than 2,000 examples of reported building failures are already stored in the center's data bases, and many thousands of citations should be available to researchers and government agencies by 1984.

As an example of how the AEPIC Center might be used, Loss pointed out that the late famed architect Frank Lloyd Wright might have used the center's data bank to avoid structural difficulties now being detected in one of his architectural masterpieces, "Falling Water" the home of industrialist Edgar Kaufmann built in 1937-38 in Bear Run, Pa.

Some Major Disasters in the United States In the Past 6 Years

- ☐ The collapse of the Teton Dam in June of 1976;
- ☐ The collapse of Kansas City's Memorial Arena in 1979;
- ☐ The collapse of the roof of the Hartford Civic Center in 1978;
- ☐ The collapse of the Sky walk in the Hyatt Regency Hotel in Kansas City, only last year.

UPI Photo

Aftermath of disaster at Hyatt Regency Hotel in Kansas City, Mo.

THE SUN, Sunday, August 8, 1982

New UM center will analyze causes of structure catastrophes

By David Simon
Special to The Sun

College Park—When he was a student at Cornell in the mid-1950s, Neal Fitzsimons remembers reading about building disasters and collapses and asking his professors one simple question: "Why?"

But for all the laboratory research and theory, no one could really explain definitively why one structure lasted longer than another, or why one bridge collapsed when a similar span remained secure. Historical data were poorly organized, and each architectural collapse was, more often than not, treated as a novelty.

"There have always been building failures," says Mr. Fitzsimons, who now heads an engineering consulting firm in Kensington. "But there's never been any systematic attempt to collect enough data to really understand or prevent them."

For 18 years, Mr. Fitzsimons pushed and prodded his colleagues, as well as federal agencies, to establish a repository for disaster data in the private sector, a centralized computer base for all the world's crumbled dams and battered bridges.

Twice he brought engineers and architects from Europe and the United States together to discuss the idea, and more than a dozen times he approached federal agencies and private sources for funds for the project.

Now, little more than a year after an elevated platform in the Hyatt Regency Hotel in Kansas City, Mo., broke from its supports and collapsed, killing 111 persons in one of the world's worst engineering catastrophes, the world's first disaster bank is a reality.

Financed by a $75,000 National Science Foundation grant, the University of Maryland has founded the Architecture and Engineering Performance Information Center (AEPIC). It is scheduled to open in 1984.

Although Mr. Fitzsimons has worked for creation of such a center since 1964, he and others attribute the renewed interest in the project to a series of recent engineering disasters that have attracted public attention: the collapse of the Teton Dam in 1976, the collapse of Kansas City's Memorial Arena in 1979, the collapse of the roof of the Hartford Civic Center in 1978, and, most important, the tragedy in Kansas City last year.

"Our objective," says Donald Vannoy, a UM associate professor and co-director of the project, "is to learn from past mistakes so that we can improve structural designs and prevent future tragedies."

Dr. Vannoy, along with John Lost, a UM associate dean of architecture and co-director of the center, hope that AEPIC will become a prototype for other such centers worldwide, with the central data bank housed at the College Park campus.

The data bank could be used by engineers, architects, private investors, insurance underwriters, journalists and others looking for historical and structural data.

"By charging a fee for the center's services, we hope to make AEPIC self-sufficient within two or three years," Dr. Vannoy said.

More than 2,000 examples of building failures are already stored in the center's files, and that number is expected to increase 10 times over the next year.

The center is a joint project between the UM architecture and engineering colleges.

Building collapse data may be boon to engineers

Rescuers sift through debris after Harbour Cay collapse.

By Peter Larson

OF THE SENTINEL STAFF

For three years architect John Loss chased around the Southeastern United States collecting information about collapsed buildings.

It was a nerve-racking chore.

"Everything was filed in a different place," he recalls. "Hurricane structure failures were in one place, earthquake damage would be somewhere else."

The paper chase will be a lot simpler when the University of Maryland opens a computerized data bank on collapsed structures in 1984. The Architecture and Engineering Performance Information Center will be the first archives of its kind in the world, and may eventually save thousands of lives.

"I rather expect it will revolutionize building codes and standards," predicts Loss, co-director of the project and associate dean of architecture at the University of Maryland. "For the first time we'll be able to analyze design and engineering failures in a comprehensive way."

More than 2,000 cases of reported building failures are being put in the computer memory. Thousands of other cases, involving collapsed bridges, dams, roads and structures, will be on file by the time the center opens two years from now.

Victor Schinnerer & Co., the largest underwriter for engineering and architectural liability insurance in the nation, is releasing 40,000 case records for the archives. The National Science Foundation awarded a $74,000 grant last month to help fund the project.

Earlier attempts to document and study structural failures were confined to isolated incidents, or handicapped by poor recordkeeping. Once the center opens, engineers and architects will have thousands of case records at their fingertips.

"If someone's building a condominium in Florida or a parking garage in Chicago, they'll be able to see problems associated with those structures in the past and avoid them," said Donald Vannoy, associate professor of civil engineering at the University of Maryland, also a co-director of the center.

The file will not only help prevent catastrophes like the Kansas City Hyatt Regency skyway disaster or the Harbour Cay condominium collapse in Cocoa Beach, but will avoid structural defects that cost billions of dollars a year, ranging from poor windows to faulty roof decks and leaky exterior walls, Loss hopes.

"The center will get architects and engineers interested in research. They'll begin to find relationships and interconnectedness between cases that you can't see on a case-by-case basis."

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Other researchers have attempted to build similar balances, but have never been able to achieve the sensitivity needed. Tschanz's balance, however, is accurate to within one-third of a gram. The sound of the lab's door closing jolts the oscilloscope trace. The weight of a penny sends it off the scale.

That level of sensitivity is achieved through careful machining, state-of-the-art strain gaging and good electronics, Tschanz says. □

Military would defer cleanup

A Reagan administration proposed change to the Clean Water Act requested by the Department of Defense would allow electric utilities and private industry to ignore the law in times of national emergency and would expand the President's authority to exclude toxic dischargers and new pollution sources at all federal facilities from requirements of the act.

The proposed amendment could have disastrous results for the nation's waterways, says Larry J. Silverman, executive director of the American Clean Water Association. In the case of another oil embargo, the President could declare a national emergency and exempt all energy-producing facilities from the requirements of the act, he says.

U.S. interest. Currently, the act allows the President to exempt for one year any existing effluent source of any department of the executive branch not discharging toxics, if it is in "the paramount interest of the United States to do so." The President may also issue regulations exempting from compliance any equipment, vessel, or other class of military property.

Last month the Environmental Protection Agency submitted to Congress the administration's proposed amendments to the Clean Water Act (ENR 6/3 p. 11), including the DOD request. The changes would allow exemptions for toxics and new sources and extend the exemption period to three years. The authorization to exempt by regulation would be extended to all government-owned facilities. And the President would have the authority to modify or suspend the Clean Water Act in a national emergency or declared war.

The Department of Defense wanted the changes so that currently inactive munition facilities could be brought on line without violating provisions of the act. Toxic derivatives of trinitrotoluene, TNT, are formed when the explosive is produced. With the exemption period extended, if a formerly inactive facility were to be brought on line, the water pollution control equipment necessary to meet the act's requirements could be designed and installed within the three-year period, says Donald K. Emig, director of environmental policy at DOD.

Mobilization. Emig notes that the other DOD-requested changes in the act would allow any segment of private industry to be exempted from the act's requirements in a crisis. Because military bases are like small cities, if a base were to be mobilized it would need all kinds of goods, and the manufacturers of those materials could be exempted from complying with the act, he says.

The proposed amendment is viewed by some as an issue of equity. "If industry, state and local governments are required to meet toxic discharge limitations, yet the federal facility downstream is exempt from those requirements, how can the states be expected to achieve clean water goals?" asks Robbi J. Savage, with the Association of State and Interstate Water Pollution Control Administrators. □

Computerized toxics watch

A new computerized toxic spill alert system may help allay safety-conscious communities' fears about hosting industries that use or produce hazardous chemicals.

The warning system consists of a network of air monitors feeding meteorological, chemical and, when necessary, spill data to an onsite central processor. The system merges that information with plant layout diagrams and community maps and predicts for plant safety officers where the vapor is moving, at what rate, and which agencies to notify about possible evacuation.

The software is an offshoot of air-pollution models developed to meet the Environmental Protection Agency's permitting requirements for new facilities, according to C. Gary Gelinas, executive vice president of Form & Substance, Inc., Westlake Village, Calif., the firm that created the package.

"The difference between the two models is that toxic spill dispersions are short-term events, not continuous," he says. The system includes software and hardware.

Tailoring the system to individual sites and installation take about one month. First, potential leak areas are identified and a table of stored chemical characteristics and amounts compiled. Then, plant maps, emergency information, and community maps—roads, industry, hotels, gas stations, etc.—are entered.

Most information is put into the system by tracing the graphics with a light pen and can be updated the same way, says Gelinas. Meteorological data—wind speed, weather, etc.—are monitored

Toxics monitoring system models spills

constantly by the system via sensors. When an accident occurs, the background information and the current weather are merged, allowing the system to model in real time the movement of the toxic vapor.

On a color CRT screen, plant operators see a plant diagram locating the spill and then a list of appropriate agencies to contact, including phone numbers and specific information each agency must know. Spill movement is continually updated as the event happens, says Gelinas, until it is contained or beyond the monitoring boundaries.

So far, the company has sold five $50,000-to-$80,000 systems to large chemical-producing corporations. □

NSF expected to fund EPIC failure archive

The long-standing proposal for a central archive of failure data is in the final stages of receiving the federal funding that could make it a reality.

"We're off, I hope, to a flying start," says Neal FitzSimons, one of the chief supporters of the archive, which has

been known as the Engineering Performance Information Center (EPIC). Fitz-Simons is chairman of an American Society of Civil Engineers committee that has been attempting to plan and find backing for the center (ENR 5/28/81 p. 13). EPIC would serve as a central repository for information on all types of failures for the use of researchers, engineers, architects, insurance companies and lawyers.

The National Science Foundation is in the process of approving a grant to aid in assessing the feasibility of the archive, planning its structure and running it for the first two years of its existence. The grant will go to the University of Maryland, which will be the site of the center.

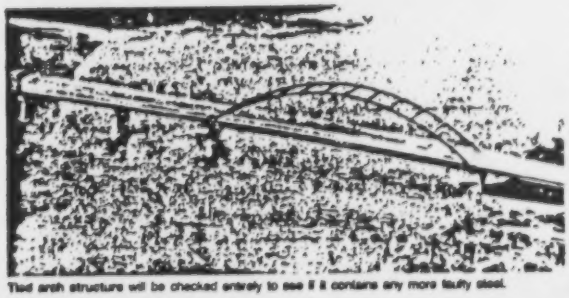
NSF expects the operators of the archive to figure out how to make it self-supporting after the first two years. "We can't afford to give it long-term support," says Frederick Krimgold, program director for architecture and planning in NSF's division of civil and environmental engineering. "It's not going to be a federal agency activity."

NSF hopes that engineers, architects, insurance companies and technical organizations from around the world will supply data to the archive free or at cost in exchange for the benefit the archive has to offer. EPIC users may be charged a fee to cover the cost of operating the system, Krimgold says.

The thrust of the failure center has changed somewhat since it was first proposed, Krimgold explains. Originally conceived of as a source of engineering data, it will now emphasize architectural data as well, he says. The supporters of the center want it to become a source of information on not just dramatic collapses, but also on the small deficiencies in structure, roofing, windows, facing or usability that crop up most often and cost the most in litigation.

At the University of Maryland, the center will be operated jointly by the civil engineering and architecture departments. □

Cracked bridge still closed



Tied arch structure will be checked entirely to see if it contains any more faulty steel.

Iowa's Department of Transportation will not reopen a Missouri River bridge that has a cracked tie girder until measures are taken to prevent further cracking in the faulty member and tests are conducted to determine the quality of the steel throughout the structure. The agency had hoped to bolt a temporary splice over the crack and open the tied arch bridge to limited traffic (ENR 5/20 p. 16).

A DOT crew recently discovered the crack running the 31½-in. width of a 2¾-in.-thick top flange of one tie girder. The state then closed the four-lane bridge, completed only 15 months earlier, which spans the river between Sioux City, Iowa, and South Sioux City, Neb.

The decision not to reopen the bridge now was made on the recommendation of consultants retained by DOT—Wiss Janney Elstner & Associates, Northbrook, Ill., and Howard Needles Tammen & Bergendoff, Kansas City, Mo., the firm that designed the 425-ft arch bridge.

Mill tests taken and certified by U.S. Steel Corp. at the time it produced the flange plate that cracked indicated that it met or exceeded specifications. However, later analysis by Wiss Janney and U.S. Steel found that it was below the specification for toughness, according to George Norris, a DOT spokesman. The consultants will test cores from various locations on the bridge.

Previously, a flange crack was discovered on a similar tied arch bridge across the Mississippi between Iowa and Wisconsin. Material supplied by U.S. Steel for that structure was found to be deficient and the company agreed to have its American Bridge Division make repairs under an agreement providing that the firm will not be paid if it is found to be responsible for the faulty plates. □

Worldwide protests

Ire mounts over embargo on licensed U.S. technology

U.S. officials hold out little hope for early major modification of President Reagan's ban on the use of U.S. technology or equipment on Soviet energy projects until there is some real improvement in the Polish situation. At the same time they concede that there is a real danger that the ensuing confrontation between the U.S. and its European allies could escalate into a full-fledged trade war that would severely weaken the Atlantic alliance.

Meanwhile, other governments as well are strenuously protesting U.S. actions. The latest embargo covers not only the use of U.S. licensed technology on the gas pipeline from Siberia to western Europe, but on projects such as a Japanese company's exploration of the USSR's Sakhaklin offshore petroleum field using U.S-made equipment.

In addition, Reagan's original embargo announced in December included a ban on licensing technology to the Soviet Union itself. That is said to have hung up hydroelectric developments in Colombia and elsewhere that were to be supplied with Soviet equipment licensed by U.S. firms.

But because the stakes are so high for both the U.S. and Europe, officials express confidence that ways will be found to defuse the crisis. "It is inconceivable that George Shultz will inaugurate his tenure as Secretary of State by presiding over a declaration of trade war with our major allies," says one high official. "And Shultz, at least at the outset, has tremendous political clout with the President."

One top official suggests that the pipeline issue could be left on the table for a while if no European nation invites a government-to-government confrontation with the U.S. by ordering one of its companies to flout Reagan's sanctions and the Soviets don't invoke penalties against European companies for failing to honor their contracts to supply equipment for the pipeline.

So long as a foreign government doesn't order a company to flout Rea-

ildings department, "so we can't infe a total veil of secrecy." But the city lieves that withholding names of witsses "induces a high level of volun cooperation" during testimony.

The city has revealed it is sending arts of the derrick to the Fritz Engieering Laboratory at Lehigh Universi, Bethlehem, Pa. So far, the heel of le derrick boom—a 15-ft-long section rom the pin up—has arrived. "Apparently, the heel section bent itself around a girder in the accident," says one lab engineer. Roger Slutter, the lab's director of operations, heads the project.

In addition, says Munoz, the city is investigating many avenues, including the pick points and the weight of the crane boom. He adds that there have been no lawsuits filed against the city.

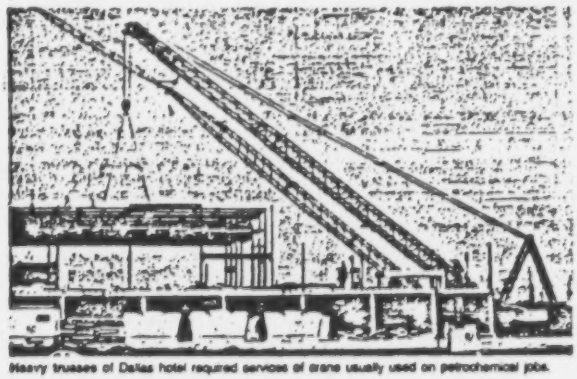
Doubts about having removed the protective sidewalk sheds still remain. Irwin G. Cantor, the New York City-based structural engineer for the building, says if the sheds had still been in place, there may have been fewer injuries. But he says sheds are not designed to stop a piece of granite plummeting 400 ft. Vincent DeSimone of DeSimone & Chaplin, a New York City structural engineer, adds: "The shed would not have done any good with granite chunks weighing more than 200 lb. When that stuff hits, it's like shrapnel."

Cantor suggests adding rules to require precast planks instead of wood for sheds and leaving them in place longer.

His office is now checking the damage to the building.

The city expects to conclude its inquiry by the end of August and eventually to make its findings public. □

Crane makes building debut



Heavy trusses of Dallas hotel required services of crane usually used on petrochemical jobs.

A crane normally used for heavy construction on refineries and chemical plants—and the only one of its kind in the U.S.—handled its first building job in erecting large trusses over the ballroom of the Registry Hotel in Dallas recently. The crane cut estimated truss-erection time by about 75%, the steel erector says.

The general contractor for the 15-story, 570-room hotel, the Dallas office of the Kraus-Anderson Construction Co., is facing a construction schedule of 20 months from groundbreaking to completion. Conventional methods for placing the ballroom roof trusses would have been too slow even if feasible, the contractor says.

The main ballroom is on the upper level of a two-story wing. The 116 x 216-ft room is about 20 ft in on each side from two outer walls of the building and 80 ft in from the back, where the crane would have to be installed.

One alternative was leaving out part of the first and second-floor slabs so a conventional crane could get in close enough to the ballroom to handle the heavy trusses, but this would have delayed the overall schedule. The steel erector had bid the job intending to build the trusses in place, but this also would have taken too long—three to four weeks.

The contractors huddled and decided to erect the 116-ft trusses in one piece. Because of the weight, however, they needed a crane that could handle 40 tons at a reach of 200 ft and a boom angle of 15 to 18 deg. The heavy-duty crane was brought up from a Houston petrochemical job to fill the bill.

The heavy-rigging division of Johnston International, Longview, Tex., imported the truck-mounted crane from Germany in January for use on petrochemical jobs. "Probably it will be rated as a 1,000-ton crane after further tests," says Johnston's Gary Spriggs.

The Dallas hotel's ballroom is spanned by 10 major trusses, with intermediate trusses between them. They are typically 11 ft deep and weigh as much as 59 tons. "The distance from the center pin of the truss to the center pin of the crane was 165 ft," says K.L. Robinson, president of the Dallas-based steel erector, the D/FW Steel Co.

The trusses were so large that it was necessary to use a second crane—a 150-ton crawler crane with a 250-ft boom—to stabilize them immediately after they were set by hanging secondary steel between them.

Erection of the completed trusses took only four and a half days, Robinson says. □

Failure center opens

Archive will store data on problems large and small

Supporters of a proposed archive devoted to engineering and architectural failures finally cut the ribbon last week on the archive's first official home.

The archive was first proposed in 1964 as a way of preventing failures by providing a central place for architects, engineers and others to find information on bad experiences with different types of structures and materials.

To emphasize that the archive is not just for structural failures, its organizers have added two words to the beginning of its former title and added a letter to its acronym. It is now known as the Architecture and Engineering Performance Information Center (AEPIC).

The center will be housed in an engineering school building at the University of Maryland (ENR 7/15 p. 29). According to Donald W. Vannoy, an associate professor in the university's school of civil engineering, the National Science Foundation has provided a grant of more than $73,000 to fund the center's first year of operation. NSF will make a separate grant to cover the second year's expenses, depending on how far along the center is by that point, Vannoy says. After that, NSF expects the archive to become self-supporting.

Vannoy will run the center jointly

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th John Loss, associate dean of the iversity's school of architecture.
The center will be a repository of formation on failures of all types—ot just the major failures but the ev-yday things that nickel and dime you," ys Neal FitzSimons, a Kensington, d., consultant who has been a key in-ence in getting the center started. ie data files eventually will include ngs as diverse as major structural col-lapses, minor roof leaks and highway intersections in which traffic will not flow properly. Anonymity will be preserved if necessary, FitzSimons says.

Information will be stored on a computer in two forms—a "citation file" containing only summary information on each failure, and a more detailed "case file." The AEPIC office will also house a dossier library containing newspaper clippings, investigation reports and other information on particular failures.

According to FitzSimons, AEPIC will eventually sell computer discs containing all of its recorded data on different types of failures.

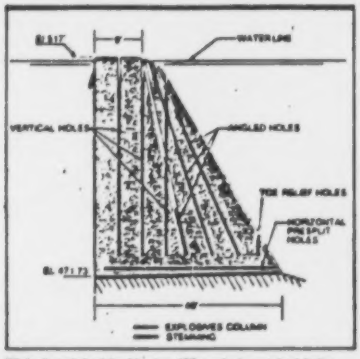
Anyone interested in contributing information to AEPIC can contact Donald Vannoy, Department of Civil Engineering, University of Maryland, College Park, Md. 20742. □

Blasting weir clears hydro site

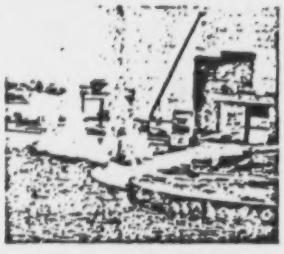
ntractors in Kentucky ve successfully completed delicate, underwater blast-g operation to remove a e-section concrete weir tream from a completed werhouse at the Corps of gineers' Greenup Lock d Dam.

The $120-million, 70-Mw w-head hydropower pro-t, located on the Ohio ver, uses a prefabricated werplant that was floated the site last fall (ENR '10/81 p. 14). The 150-ft-ng, 45-ft-high weir was left place to act as a coffer-m during construction of e guidewalls and founda-m for the powerplant.

To prepare the structure r blasting, job contractor, he Ruhlin Co., Akron, hio, spent two months illing angled holes on 4-ft centers ross the 10-ft-wide top of the weir and rizontal holes on 18-in. centers across e full width of the pier near the base. Because space on top of the weir was limited, the drill was attached to a atform and pulled across the structure cable. Once drilling was complete, e blasting subcontractor, Controlled Demolition, Inc., Phoenix, Md., packed the 455 holes with explosives and blasted the weir.



Weir demolished by blowing 455 explosive-packed holes.



The job was a tricky one, says Brian M. Relle, CDI chief engineer, because water pressure on the new powerplant due to the demolition was limited to 15 psi and allowable vibration against the guidewalls was also low. To meet those requirements, CDI demolished the weir in eight detonations over 10 days, timing each one to blow in a series of explosions in less than a second.

The vertical holes were placed to reduce the weir to fragments that Ruhlin could scoop out with a 5-yd clamshell attached to a barge-mounted crane. In each of the eight detonations, the horizontal holes were blown first, followed by the vertical ones. Blowing the bottom holes first created a clean intake face out of the weir foundation. Ruhlin last week completed removing weir debris, and the powerplant is scheduled for testing this month, says Barry L. Lyon, Ruhlin assistant project manager. □

Slurry pipeline bill moving

a 25-to-21 vote, the House Public Works Committee at last cleared federal minent-domain legislation for coal urry pipeline builders. The vote was mmediately hailed as a victory by the liance for Coal and Competitive Transportation (ACCT), a group repre-enting coal operators, mines, labor and onsumers as well as slurry developers.

A Senate Energy and Natural Re-ources Committee vote is expected this "We're very pleased," says Joseph Hillings, executive director of ACCT.

Rep. James J. Howard (D-N.J.), chairman of the the House Public Works and Transportation Committee, pressed hard to have the bill moved, despite delaying tactics engineered by Rep. Bud Shuster (R-Pa.). At one point, Shuster demanded a quorum, or 16 members present, and then ran from the room to avoid being counted. Irritated, Howard

Railroads are now working the Senate side, where Senate Energy Committee Chairman James R. McClure (R-Idaho) has expressed concern about the water-rights issue. Pipelines need dedicated water reserves to function but developers have acceded to demands now in the legislation that states have first rights over water.

Aides of Sen. Bennett Johnston (D-La.), who is influential in determining the legislation's passage, say McClure is now rethinking his opposition to it. They believe in any event that the votes are secure for committee approval. The

Ending longshore confusion

The construction industry's plea to have the Longshoremen's and Harbor Workers' Compensation Act clarified has fallen on deaf ears in the Senate. Amendments to the law approved by the upper house last week (see p. 58) provide no clear answer to the question nagging all contractors: Is construction work near navigable waters covered by the federal workers' compensation law?

If it is, as some courts have ruled under the current law and as the amendments passed by the Senate suggest, firms under contract to build piers and dockside structures would be forced to provide the same benefits the law guarantees to longshoremen, who are not covered by state workers' compensation programs. Moreover, the same contractors would have to pay exorbitant insurance premiums to provide death benefits to survivors of injured workers—benefits that are paid under ill-conceived provisions of the longshore act even if the deaths are not job related. That adds up to a windfall for survivors and much higher costs for contractors and construction users—and ultimately for consumers.

There must be a better way—and there is. The House is expected to take up a longshore amendments bill—perhaps as early as this month. It should go one step beyond the bill passed by the Senate; it should specifically exclude construction workers from coverage.

Such a bill would end the confusion that has surrounded the act from the start, place construction workers under state coverage where they logically belong, and save everyone concerned a lot of money.

Putting failures to work

When the Architecture and Engineering Performance Information Center (AEPIC) opened last week, the ceremony marked the end of almost two decades of planning and the inauguration of an unprecedented resource (see p. 13).

Engineers know that, as practical scientists, they learn more from experience than they do from theory. So do contractors, working architects and developers. But they also know that usually the only errors they learn much about are their own.

AEPIC's supporters mean to change that by collecting extensive, well-indexed case files on all that has gone wrong with everyone's projects. By conscientiously checking the AEPIC files before starting a project, designers or builders can avoid a lot of mistakes they never would have thought of on their own, with possibly lifesaving consequences.

The people who have planned AEPIC, proselytized about it and found funding for it deserve congratulations and thanks from the rest of the industry.

But now the pitch: AEPIC will never amount to much unless people take the trouble to contribute to it. Volunteer labor has brought it this far. National Science Foundation money will pay the bills for the shakedown years. User fees will keep it going after that. But what AEPIC needs more than anything else is experience, solid construction experience, the kind of experience that leaves you shaking your head and swearing that you'll never do *that* again.

The people who will be running AEPIC are now developing procedures by which contributors of historical information, would submit the data in simple report form. The AEPIC staff will do all of the codifying and categorizing. If legal liability or simple embarrassment is an obstacle to getting some informative cases for the files, the AEPIC staff is willing to hide the identities of the projects and the people involved.

If you expose some of your skeletons now, you might keep them out of other people's closets in the future. At any rate, you will be keeping alive an information source that could someday be indispensable.

Crossed wires

Two weeks ago the Reagan administration issued its first official report from the President's Council on Environmental Quality which correctly called for regulatory decisions to be made by those most affected by them. Assuming the White House meant state and local governments, the slashing of state management grants in the Environmental Protection Agency's proposed 1983 budget doesn't make sense.

The Congressional Research Service reports that states stand to lose nearly $200 million next year in grants to direct federally mandated environmental programs (see p. 12). The estimated 27% reduction from 1981 funding levels—and that figure doesn't account for inflation losses—hits hardest at state water-quality assessment and monitoring, solid-waste programs and enforcement efforts across the board.

Unless EPA and the White House can guarantee that Congress will move soon to reduce the environmental protection burdens imposed on local governments by federal laws, the result of these funding cuts together with EPA's own constriction can only lead to further regulatory confusion.

Last year's Clean Water Act amendments, for example, require that much greater emphasis be placed on water-quality needs in making regulatory decisions. But EPA's proposed budget reduces state water-quality-management funding by close to $107 million, including a 40% drop in funds for the program that provides states with water-quality data.

Intelligent regulation at the local level requires more than a slap on the back from the President. Good science and good data lead to right decisions. And they cost money.

ASCE News

Wiedeman becomes ASCE President; ailing infrastructure among concerns

This month Atlanta environmental engineer John H. Wiedeman becomes the Society's top elected official, and brings with him special concern in two areas: feeding back to the profession lessons from failures, and improving the nation's public infrastructure. He credits ASCE members Bill Neuman and Marshall Reed, respectively, with suggesting to him that ASCE give priority in these concerns.

In July a National Architectural and Engineering Performance Information Center was dedicated at the University of Maryland, College Park, and President-Elect Wiedeman was there representing ASCE.

He dreams that in 10 years AEPIC will become one of ASCE's most useful services to its practitioner majority. Reason: a good feedback mechanism for learning causes of failures will help prevent them. Wiedeman hopes eventually it will also report successful experience, and expand beyond its present focus on structures. (The AEPIC idea was the brainchild of Neal FitzSimons and born in the 1960s in ASCE's Performance of Structures Research Council. So though the Society will not run AEPIC, it can claim credit as its father.)

As for infrastructure—the nation's public roads, sewer and water pipes, ports, dams, bridges, etc.—Wiedeman has ASCE Board approval to create a task committee on infrastructure to study the problems and suggested corrections. He and many others are concerned that the nation is under-investing in its infrastructure, so it is deteriorating, and the economy will suffer if this decay proceeds.

Wiedeman sees the problem as largely a public communication one, not a matter of revised design and construction and O&M procedures, primarily, but one of showing the public and legislative bodies that more money must be spent on infrastructure. (See feature article in this issue of CE.)

John H. Wiedeman, ASCE's incoming president

Learning from engineering failures

As evidence of the value of a coherent approach to exchange of failure information, Wiedeman cites the century-old case of the Brooklyn Bridge. When its two piers were being sunk deep into New York's East River sediments in the 1870s (the piers are very deep—over 100 ft or 30m), American engineers did not know that European construction workers had died from what we now call "the bends." The farther below ground level you descend, whether in water or air under pressure, the higher the pressure on the human body. Below a certain depth, if you return to the surface too rapidly, you get the bends—nitrogen absorbed in the blood forms gas bubbles which can kill. The Europeans knew that if you decompress people slowly, fewer die. Had American engineers building the Brooklyn Bridge known this, Wiedeman says, a number of lives would have been saved.

Even today, 100 years later, Wiedeman says feedback of failure information to the civil engineering profession is inadequate. (One key reason is that a failure leads to legal claims. When a situation is in litigation, the parties are legally bound not to talk.)

Wiedeman sees merit in two complementary proposals for feeding back to the profession information on failures: (a) a federal or quasi-federal group that would investigate and report on key failures, and (b) a computerized information exchange that would store data on the thousands of building and other civil engineering problems that crop up each year. (Most are relatively minor—roof leaks, cracking walls, etc.) One promising source of failure information is reports filed with insurance companies in support of claims. (See separate story on the new Architectural and Engineering Performance Information Center, page 17.)

As for a proposed federal failure-investigations group, Wiedeman says it would operate like the ad hoc groups formed by the National Bureau of Standards (see CE 7/82, page 56, "Collapse of the Kansas City Hyatt Regency Walkways"). An advantage of a federal group is, if so empowered by an act of Congress, that the team would be assured access to the failure site and might be empowered to subpoena information. A possible disadvantage seen by some private-sector building owners: a federally created group might come under the Freedom of Information Act, so failure information today not released would probably become obtainable.

Wiedeman says there's "an urgent need to reveal failure information to the profession." Gerald Leonards of Purdue University, in his ASCE Terzaghi lecture in 1980, cited a case of pile failure which, Leonards feels, should have been publicized in the name of public safety (to help prevent recurrence of the same mistake). But the pile-failure information was held confidential.

Public infrastructure

Some Wiedeman insights in the U.S. infrastructure problem and approaches to solution:

The widely quoted book *America in Ruins*, by Pat Choate, says many U.S. cities, counties and states have seriously under-invested in maintenance and reconstruction of infrastructure. Today's the cost of backlogged reconstruction is so high, Choate says, it is questionable if the nation can

WASHINGTON POST, OCTOBER 2, 1982

University of Maryland to Research Structura Problems

By Myron Struck
Washington Post Staff Writer

The University of Maryland, with a $73,839 federal grant from the National Science Foundation, is about to establish a research center on structural problems ranging from leaky ceilings in homes to the kind of faults that resulted in the collapse of walkways at the Hyatt Regency Hotel in Kansas City.

"We hope to be able to save lives within a few years," said Donald W. Vanmey, associate professor of civil engineering and one of the center's co-directors. "We will be able to do this by having architects and engineers use our computer data base to help build buildings, bridges, roads and dams . . . with a minimum amount of structural dangers."

The proposed Architecture and Engineering Performance Center is expected to be used by dozens architects and engineers, liability insurers, lawyers on litigation cases involving collapsed structures and officials overseeing building codes and standards.

"Locally, the problems are often traumatic but extremely significant," said Frederick Krimgold, the NSF's project manager. "Water penetration in curtain walls, the nonstructural skin of a building, is causing a lot of problems here in homes. Water leaks account for a tremendous amount of economic loss, but they are not life-threatening."

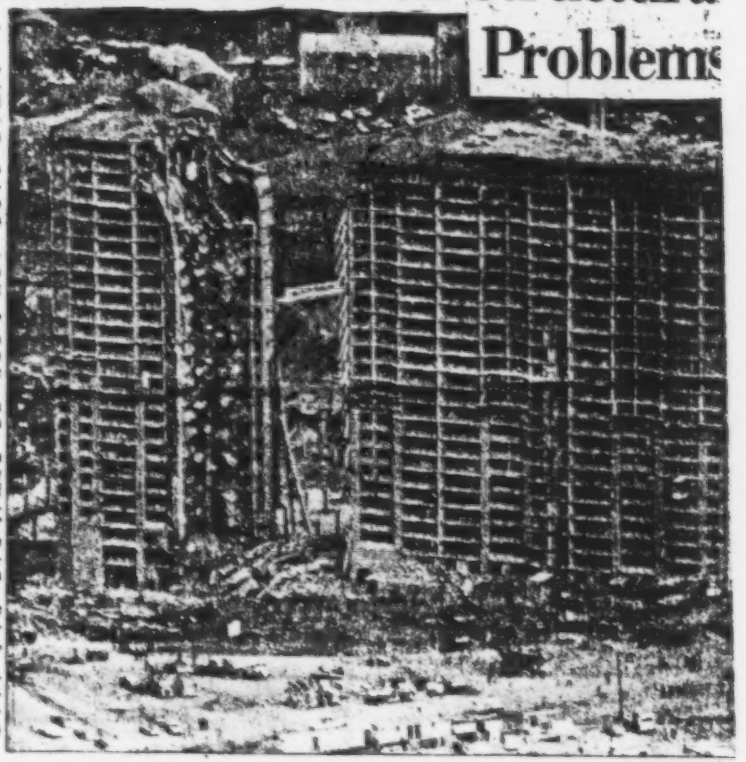
Krimgold said computers will be able to track common denominators in curtain wall problems that "amount to a tremendous amount of legal actions against builders."

"We haven't looked into the [illegible] interrelationships between man and building, of which the structural failure is the most dramatic, especially when there is a loss of life," said John Loss, associate dean of the School of Architecture and the other co-director of the project. "Some [structural problems] are definitely understood, but for economic reasons, are not dealt with."

Paul Jalecki of Victor O. Schinnerer Co., a Washington-based insurance underwriter, said: "Right now, this has been a problem accentuated by exploding technology in new products—especially in roofing products," which allow water to enter buildings.

Schinnerer is among those contributing claim documents to the data base because the insurance industry probably will use the system to evaluate premiums and give a break to those using the safest construction techniques, Jalecki said.

The computer system also will draw on information supplied by the American Institute of Architects, the American Society of Civil Engineers, the Federal Highway Administration and government agencies in Canada, Switzerland, Italy and the United Kingdom.



The Washington Po

Skyline Plaza North in Baileys Crossroads after collapse of 80-foot-wide, 24-floor section in 1973 killed 14 construction workers

Washington, D.C.

OCT 2 1982

Vanney said he believes the data bank could have forewarned architects of design flaws which led to such structural disasters as the fall of the Hyatt walkways, the bursting of the Teton Dam in 1976 and the collapse of an 80-foot-wide, 24-floor section of Skyline Plaza North in Baileys Crossroads when it was being constructed in 1973. Fourteen construction workers were killed in that Fairfax County accident.

Krimgold said that another "clearly avoidable" problem is the "$40 million refurbishing of the roof of the Kennedy Center [that] was necessary because it drained backwards, causing the ceiling to fall down." Krimgold said attention usually is focused on building structures when there is a catastrophe, "but there may be a more significant problem that only kills one or two people at a time.

"In engineering, we learn much more from our mistakes than our successes. There is a tremendous amount of information in each of these failure situations that we can use to advance our knowledge," Krimgold said. Previous attempts to document structural deficiencies have been tied to isolated incidents or handicapped by poor record-keeping, according to the NSF.

"Too often it is only the dramatic cases of total building collapse which receive attention," Loss said.

Rep. Albert Gore Jr. (D-Tenn.), who recently conducted congressional hearings on structural failures, plans to introduce legislation that would establish a new federal agency charged with studying building failures and suggesting preventive measures. Jaleckl said that task should be left to others, such as the University of Maryland.

Rescue workers search through debris for victims in Kansas City Hyatt Regency hotel after walkways collapsed in July 19

INITIAL AND ROUTE TO KEY PERSONNEL

RETURN TO: _____

Guidelines for Improving Practice
architects and engineers professional liability

Volume XII, No. 6

THE ARCHITECTURE AND ENGINEERING PERFORMANCE INFORMATION CENTER—"AEPIC"

"Make no little plans", warned Daniel Burnham, noted architect and planner at the turn-of-the-century, "They have no magic to stir men's blood, and probably will not themselves be realized. Make big plans. Aim high in hope and work, remembering that a noble, logical diagram once recorded will never die, but long after we are gone will be a living thing, asserting itself with ever-growing insistency . . ."

Fortunately for the construction industry and the design professions, members of the Committee on Damaged and Failed Structures of the American Society of Civil Engineers in 1964 made such a big plan, and there were dedicated people to pursue it relentlessly, and others who had the vision to support it.

As a result, the Architecture and Engineering Performance Information Center *(AEPIC)* was opened on July 26, 1982, at the University of Maryland.

The ultimate objective of *AEPIC* is the prevention of structural and material failures. It is predicated upon the premise that the systematic collection, collation, analysis and dissemination of information about such failures will further this objective.

Although the idea was first broached in 1964, it was not immediately accepted, but was the subject of study by ASCE's Performance of Structures Research Council. Before agreeing to support this approach, the Council spent five years in studying the need, utility and feasibility of the idea. Practitioners, academes, government officials, insurance executives, legal specialists, and others were contacted for their views on the undertaking. These inquiries were made on an international basis, during which over 1,500 citations of structural failures were collected, and a set of computer programs was developed to support the program. The groundwork and study by the Council laid a firm base for the eventual development of *AEPIC*. (It was originally for engineering and titled, "EPIC," but later architecture was added and *AEPIC* was born.)

Every idea has to have a promoter; in this case it was Neal FitzSimons of Kensington, Md., Chairman of the above-mentioned ASCE Committee, who has pursued this dream with tenacity for nearly twenty years, and to whom, with ASCE's backing, is due a lion's share of the credit for the birth of *AEPIC*.

Programs also need strong support. Victor O. Schinnerer & Company, specialists in professional liability insurance for the design professions, made a sizeable grant in 1968 to aid in these studies. In May, 1981, it made a major contribution to finance the First International EPIC Conference, sponsored by the National Science Foundation, in Washington, D.C., which assured the organization of international interest and support.

Originally, there had been plans to try to get the Federal government to set up an agency for this purpose, but it was later decided it would be better to make it a private venture which would eventually be self-supporting.* At the outset it had been recognized that some Federal funding would be needed, and an initial grant from the National Science Foundation was received, in the amount of nearly $74,000.

The *AEPIC* Center was dedicated on July 26, 1982 at the College Park Campus, University of Maryland. Its co-directors are Dr. Donald W. Vannoy, Associate Professor of Engineering, and John Loss, Associate Dean of Architecture.

It is expected that *AEPIC* will be in full operation in

*Despite the emergence of *AEPIC*, and possibly without knowledge of it, Congressman Albert Gore, Jr., of Tennessee, held hearings in August 1982 on the establishment of a federal repository of information on structural failures. No Bill has been reported as of this date.

Special Studies - 6

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1984, having a base of many cases supplied by the professions and collection centers throughout the country, plus statistics from more than 3,000 cases provided by Schinnerer & Company, which Dr. Vannoy characterized as being "immensely helpful in developing a large body of solid information."

An excellent discussion of the Center was written by Congressman Steny H. Hoyer of Maryland, who inserted a speech in the *Congressional Record* of August 17, 1982. His remarks included the following:

"Previous attempts to document and analyze structural deficiencies have been tied to isolated incidents or handicapped by poor recordkeeping. The chief advantage of the new center is that soon architects and engineers can benefit from a comprehensive collection of data on many types of failure—from the collapse of the Teton Dam in June 1976 to the collapse of Kansas City's Memorial Arena three years ago.

"All structural failures—from something as catastrophic as the collapse of the balconies in the Kansas City Hyatt Regency to something as relatively minor as the premature wear and tear of a rural bridge—have at least one very important point in common, from which valuable information can be gathered, analyzed, and reported, according to Dr. Vannoy. The objective at *AEPIC* is to learn from these common points so that structural design can be improved to prevent future disasters.

"Too often it is only the dramatic cases of total building collapse which receive attention. One of the primary goals of *AEPIC* will be to investigate secondary design flaws—flaws found in exterior walls, for example, and in roof decks. This is critical, as these are the flaws responsible for the majority of building failures.

"More than 2,000 examples of reported building failures are already stored in the center's data bases, and many more thousands of citations should be available to researchers and Government agencies by 1984.

"In addition to establishing its own data bank and reference library, the center will serve as a prototype for repositories in universities and institutions worldwide. Dr. Vannoy and Professor Loss already have corresponded with interested representatives from more than 14 American, British, Canadian, Swiss, Greek and Italian professional organizations.

"Initial support of *AEPIC* has been expressed by the American Institute of Architects, the American Society of Civil Engineers, the Federal Highway Administration, and Victor O. Schinnerer & Co. of Washington, D. C."

Information will be available to users for about $100 a report. It will be developed from case report checklists under five categories: identification of a structure, description of the failure, analysis of the failure, background of the reporter, and citations used in compiling the report. In addition, there are 31 sub-categories, including information on how a structure was built, its dimensions, trigger and other factors coatributing to the failure or distress, what loads the structure was bearing, and what procedural or other errors caused the failure.

The checklist will be used by colleges and professional construction-related organizations, which will be responsible for the actual investigation and evaluation of failure, in the particular geographic region to which they are assigned. Some organizations may choose to specialize in a particular phase of this work. When necessary, anonymity will be preserved.

Mr. FitzSimons noted that while a great deal of material of the sort needed is now collected by various agencies, such as insurance companies, it has not been available to the design professions and academes, as the information from *AEPIC* will be.

An interesting and healthy by-product of this program will be to get architects and engineers interested and involved in research. "They'll begin to find relationships between cases that cannot be seen on a case by case basis", suggests Dr. Vannoy.

By checking the *AEPIC* files before starting a project, designers and builders will be able to avoid many mistakes they would never have thought of otherwise, with possibly life saving consequences.

As suggested by *Engineering News-Record*, the "pitch" is this: "*AEPIC* will never amount to much unless people take the trouble to contribute experience—solid construction experience—to it. . . . The kind of experience which leaves one shaking his head and swearing that *this* will never happen again. A few skeletons exposed now may keep them out of other people's closets in the future, and may save lives."

Those who have experience in the failure of buildings, engineering works, systems, or materials are urged to advise Dr. Donald W. Vannoy, Civil Engineering Department, University of Maryland, College Park, MD 20742.

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Daily Record
Baltimore, Md.
MAR 8 1983

A/E Performance Information Center

The Architecture and Engineering Performance Information Center (AEPIC) opened last July at the University of Maryland to collect information on engineering and architecture failure. Co-directors are Donald W. Vannoy, Ph.D., P.E., associate professor of engineering, and John Loss, associate dean of architecture.

Remarks by Representative Steny H. Hoyer, D-Maryland, in the August 17, 1982, in the Congressional Record (quoted in "Guidelines for Improving Practice" and published by the Office of Professional Liability Research of Victor O. Schinneret & Co., Inc., et al.) describe the activities of the center.

"Previous attempts to document and analyze structural difficiencies have been tied to isolated incidents or handicapped by poor recordkeeping," said Hoyer. "The chief advantage of the new center is that soon architects and engineers can benefit from a comprehensive collection of data on many types of failure — from the collapse of the Teton Dam in June 1976 to the collapse of Kansas City's Memorial Arena three years ago."

The congressman said "All structural failures — from something as catastrophic as the collapse of the balconies in the Kansas City Hyatt Regency to something as relatively minor as the premature wear and tear of a rural bridge — have at least one very important point in common, from which valuable information can be gathered, analyzed and reported. The objective at AEPIC is to learn from these common points so that structural design can be improved to prevent future disasters.

"Too often it is only the dramatic cases of total building collapse which receive attention. One of the primary goals of AEPIC will be to investigate secondary design flaws — flaws found in exterior walls, for example, and in roof decks. This is critical, as these are the flaws responsible for the majority of building failures, he said.

"More than 2,000 examples of reported building failures are already stored in the center's data bases, and many more thousands of citations should be available to researchers and government agencies by 1984," said Hoyer.

"In addition to establishing its own data bank and reference library," he said, "the center will serve as a prototype for repositories in universities and institutions world-wide. Dr. Vannoy and Professor Loss already have corresponded with interested representatives from more than 14 American, British, Canadian, Swiss, Greek and Italian professional organizations."

Information on failures will be available to users for about $100 per report.

It is believed the analysis of the computer data bases kept by the center will enable architects, researchers, and engineers to be more cognizant of failures which are not immediately obvious on a case-by-case basis.

While computer models are not finished, they will be available to users of the AEPIC center in the near future.

For more information or to contribute data to the center, contact Architecture and Engineering Performance Center at the University of Maryland in College Park.

PEPP Member To Advise A/E Center

David Lillard, P.E., has been appointed to represent NSPE's Professional Engineers in Private Practice division on the advisory council of the recently formed Architecture and Engineering Performance Information Center (AEPIC) at the University of Maryland.

Lillard will provide liaison between PEPP and AEPIC, and will provide technical input on the advisory panel. An engineer with Black and Veatch of Kansas City, Mo., Lillard is chairman of PEPP's Professional Liability Insurance Committee and a former PEPP chairman.

AEPIC was formed to collect, analyze, and disseminate information on the performance of structures. The center's data base is designed for architects and engineers to efficiently retrieve information on incidents involving the performance of projects for which they are responsible.

The center's goals are twofold: to improve professional practice, and to prevent the repetition of poor practice. Information in the AEPIC data base is structured for use in planning new projects; reviewing existing projects; teaching; modifying codes and regulations; planning research on structural performance; preparing professional texts; developing new construction products; or investigating for negotiations, arbitration, or litigation involving structural performance.

A-EPIC

AIA SERVICE CORP. TO BE HEADED BY JAMES CRAMER

James P. Cramer, executive vice president of the Minnesota Society/AIA for the past four years, has been named president of the AIA Service Corp.

He will oversee all business management functions of the Institute, effective Nov. 1.

The AIA Service Corp., with nearly 70 staff members, embraces all Institute income-producing activities, e.g., PSAE, the AIA Journal, publications and management services. It is one of three entities—the others are the AIA and the AIA Foundation—resulting from the comprehensive management reorganization implemented in January to streamline AIA programs and expand effectiveness of membership services.

"The Institute is fortunate to bring in a leader of Jim Cramer's caliber. His extensive academic, publishing and managerial experience will enable the AIA Service Corp. to grow into a more profitable enterprise so that we can better serve our nearly 40,000 members," said AIA President Robert M. Lawrence, FAIA.

"As chief executive officer of one of the Institute's most successful and diverse components, Jim Cramer has effectively responded to the needs of nearly 1,000 members in Minnesota. He also has been publisher of the award-winning AM 'architecture minnesota' magazine, cited in 1982 by the American Society of Association Executives as 'magazine of the year' published by a small association. AM also was a finalist in the National Magazine Editors Association 1982 competition.

"In addition, Cramer's service on the 1982 Long-Range Planning Committee has given him a broad perspective on how the Institute and the AIA Service Corp. work," Lawrence noted.

Cramer also has served as a management and long-range planning consultant for nonprofit and profit corporations in 11 states.

Currently, he is serving a two-year term as chairman of the Council of Architectural Component Executives (CACE) and is an ex officio member of the AIA Board of Directors.

In addition to directing operations of one of the AIA's largest components, Cramer has been an adjunct faculty member at the University of Minnesota Graduate School. He was named Minnesota's "Community Educator of the Year" in 1978.

A native of Aberdeen, S.D., Cramer has resided in the Twin Cities area for the past 12 years.

NEW MARYLAND CENTER OFFERS RESOURCES ON BUILDING FAILURES

The nation's first clearinghouse on building failure information opened recently in College Park, Md., to provide design professionals nationwide with unprecedented resources for solving structural and architectural problems.

Located at the University of Maryland, the Architecture and Engineering Performance Information Center (AEPIC) includes extensive archival data with well-indexed files on previous building failures.

To avoid possible structural mistakes, practitioners can contact the center before starting on a particular building project. They can learn about problems related to similar structures and about life-safety design techniques to use.

The center, funded for two years by the National Science Foundation, is viewed by the AIA as a major educational outlet for architects, engineers, researchers and others concerned about life safety in the built environment. Coordinating the AEPIC's operations will be John Loss, AIA, associate dean of the University of Maryland's School of Architecture, and Donald Vannoy of the civil engineering department.

AIA Board member Theodore F. Mariani, FAIA, Washington, D.C., and Henry Lawrence, AIA, codes and standards director, attended the recent opening ceremonies.

Contact: AEPIC, Department of Civil Engineering, University of Maryland, College Park, Md. 20742.

7 HOME-STUDY COURSES ARE AVAILABLE FROM THE AIA

The Institute is offering a series of home-study professional development programs ranging from "Marketing Architectural Services" to "Reducing Professional Liability in Your Architectural Practice."

The seven AIA professional reference programs are described in a new two-color brochure now available from the Institute. Other courses include "Land Development for Architects," "Creative Financing of Development Projects," "Passive Solar Design," "How to Conduct Energy Audits" and "How to Reduce Production Costs with Systems Drafting."

Each course is completely self-contained and can be completed in 20 to 50 hours depending on the complexity of subject matter. The brochure lists the study time required for each program, along with continuing education units (CEUs) to be earned.

All seven home-study courses contain a series of skill development exercises which can be submitted for review and comment to the MGI Management Institute Analysis Center, Larchmont, N.Y. These courses are being presented for the Institute by MGI, a national leader in professional level continuing education programs.

The brochure includes a "No Risk Enrollment Form" which allows courses to be requested on a no-cost basis for a 15-day period. For copies, contact Wm. Cameron Tucker, AIA, professional development programs, or call MGI, (914) 834-8798.

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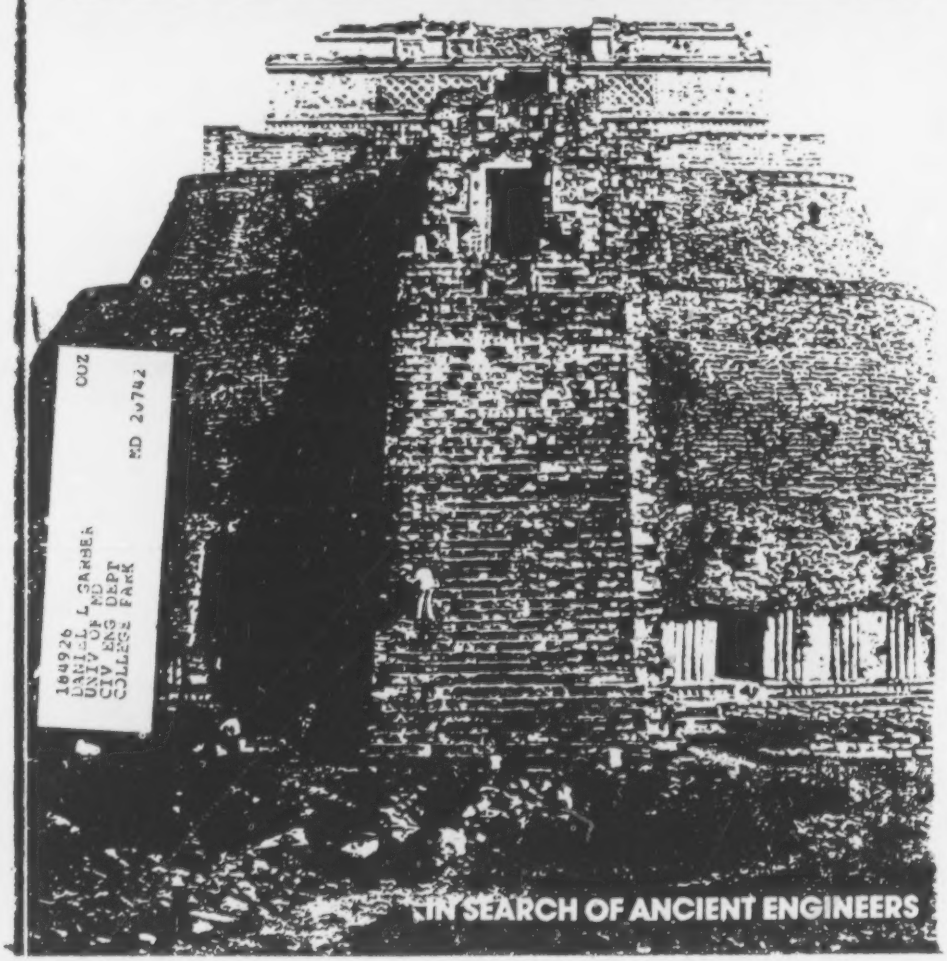
OCTOBER 1983



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DANIEL L GARNER
UNIV OF MD
CIV ENG DEPT
COLLEGE PARK
MD 20742
002

IN SEARCH OF ANCIENT ENGINEERS

DATA ON FAILURE TRENDS TO BE OFFERED

The Second International Conference of the Architectural and Engineering Performance Information Center met recently at the University of Maryland and its 50 invited participants from the U.S. and abroad established a target date of January 1984 for full on-line operation of its data base for clients.

The two-day conference addressed such issues as the kinds of users most likely to avail themselves of the data base, methods for collecting data including regional data collection centers, input reporting formats including form design, and future funding.

The intent of the data base system is to provide the design professional with a working tool which hopefully will eventually reduce the incidence of failures in buildings and structures. However, it was agreed that the initial heavy users of the system will probably be researchers, educators, forensic architects and engineers, lawyers, and perhaps investigative reporters. The increased use of the home computer for accessing data banks and the appearance of low cost information retrieval systems now available to the design office, should change this picture and encourage design professionals to use the AEPIC system.

As the design professional becomes more aware of the AEPIC system and if user fees are kept to a minimum, usage should increase rapidly. Keeping the user fee to a minimum implies that funding for the on-going development of AEPIC will be necessary from other sources. Activities such as the publication of statistical information about failures and in-depth reports would be one possibility for raising funds. It might also be supported by selected organizations as well as the government. The initial operating budget is a modest $250,000.00 per year, so it appears feasible to raise a good portion of this money from outside organizations or related activities.

The participants were not convinced that the establishment of regional repositories was a vital first step. Instead, emphasis should be on establishing the central headquarters at the University of Maryland and refining the methods of data collection. If early efforts are too diluted, development of the operating system could be delayed.

The process of data collection was discussed in detail and suggested reporting forms were analyzed. It was generally agreed, however, that two forms would be desirable: one for citation reporting, which would be completed soon after a failure took place, and the other, a more detailed form, would be necessary for incident reporting.

THE DATA BASE WILL PROVIDE DESIGNERS WITH A WORKING TOOL WHICH WILL EVENTUALLY REDUCE THE INCIDENCE OF FAILURES IN BUILDINGS AND STRUCTURES.

The incident report would be prepared by an investigator involved with the case and include many of the specifics from which lessons can be learned. If the case is in litigation, sensitive information would be suppressed. Copies of reports and other back-up material would be available by separate request. Both report forms would be designed so that the input could be easily entered into the computer in a standardized format.

Computer software is currently being developed so that it can be adapted to different hardware configurations. One of the important results of AEPIC will be the ability to statistically manipulate the information about failures and performance which have been entered into the data base. This kind of information will be useful for researchers and for the publication of reports from the center. Also, if the design professional is to learn from the mistakes of others, the data which forms the information base must be retrievable in an extremely flexible manner. Utility, therefore, has been the key to the development of the computer software.

The key to the success of AEPIC will be the willingness of the professionals to share information about mistakes. Insurance companies have been extremely cooperative and also financially committed to the success of AEPIC. Many professionals are already beginning to respond to AEPIC requests for copies of investigative reports, and participants in the program are very optimistic. The target date for full on-line operation to clients is January 1984.

(CE thanks Raymond A. DiPasquale, F. ASCE, Ithaca, NY, for this report.)

PREVENTING CLADDING FAILURE

"Second only to roof leaks, cladding represents the greatest area of lawsuits against architects and engineers," said Robert Brust (Brust Engineers, Inc., Milwaukee, WI) at the American Institute of Steel Construction Seminar in New York City last June.

As a result, said Brust, it's vital to determine exactly who has legal responsibility for the cladding design. The architect, for instance, not the structural engineer, is responsible to the owner for cladding design since it is not part of basic engineering services. "The engineer is responsible for forces delivered to the structure from the cladding," said Brust, "but not for the cladding itself.

"The architect can subcontract out for the services of an engineer or can specify that the contractor is to provide all engineering services of the cladding. But this doesn't relieve the architect of responsibility; it just adds more liable parties. The architect," he said, "is also responsible for complete interfacing of all materials to be used on the exterior. If the contractor is to be responsible by specification, the architect must remember that he still has some liability because he must check and approve shop drawings and interfacing of contract responsibilities."

For these reasons, he added, it's wise to include in the specifications a list of engineering firms experienced in cladding from which the contractor must select one to serve as consultant if the cladding is at all complicated. Experience in problems with vapor pressure, compatibility of materials, and general overall experience should be necessary for such firms.

Another area not to be overlooked in cladding design, continued Brust, and more dangerous in corroding a building than standing water, is moisture trapped in walls. This moisture pushes outward during the winter—with vapor pressure possibly up to 10 lb/ft^2 or more—through spaces as small as a pinhole. This vapor condenses in cavity areas, causing high humidity and a constant supply of moisture, corroding the cladding and support materials. The wall system design must therefore be tight against air movement through the walls.

Other measures to watch for is designing cladding support systems to with-

QUALITY ASSURANCE IN CONSTRUCTION: HOW TO IMPROVE IT

The first National Conference on Quality Assurance in the Building Community convened in Dallas for 3 days on July 18 with 150 representatives from all segments of the construction industry assessing the state of quality in U.S. construction, the reasons for a perceived decline in quality, and what needs to be done to improve.

The consensus was that conditions will not improve unless there is a concerted nationwide effort by all parties to develop a quality management system which addresses quality assurance and quality control from project conception to completed project startup and on into maintenance programs. Presently, it was said, no industry-wide organization is actively working on this. The QA programs developed for the nuclear industry are regarded as too cumbersome for general construction.

An advisory committee agreed to work to form a Construction Quality Forum to coordinate the activities of concerned organizations in developing recommendations for industry-wide quality management systems.

The conference was organized by Dallas concrete consultant James M. Shilstone, Sr., and featured representatives of owners, developers, architects, engineers, contractors, investors, lawyers, and governmental agencies. According to Shilstone, this is the first national meeting of representatives of the entire construction community to address this issue.

The prevailing theme of the conference was that a quality management system which applies throughout design and construction does not exist. Minimizing the field presence of design professionals was probably the most often repeated reason for problems occurring during construction. Homer M. Sandridge, vice president of Victor O. Schinnerer & Company, Inc., a professional liability insurer, stated that by discouraging site supervision by designers, the professional liability insurers may have actually contributed to the decline in quality. Designer absence at the site not only creates more opportunities for problems, it also deprives the designer of the practical experience so vital in preparing better contract documents on future projects.

Alan Goldstein, an attorney who represents contractors on construction claims, pointed to avoidance of responsibility, particularly by architects and engineers, as a major source of problems. Standard AIA contracts rarely refer to quality assurance and are written with a philosophy that attempts to shift responsibility away from the designer, particularly on the job site. Also, the contractual language currently used by most architects and engineers regarding their approval of shop drawings is very evasive. Goldstein also spoke about public bidding laws and how they can often work against quality by permitting contractors with questionable credentials to obtain contracts simply because they have the lowest bid, and by forcing designers to accept substitutes that may be inferior. Goldstein also said that most construction claims are related to delays.

Several speakers said that the pressure to complete projects quickly often leads to many problems during construction, since the design is often rushed into construction without the benefit of thorough review and coordination. This results in many changes which might have been avoided.

The analysis of past construction claims and problems can be a valuable tool in avoiding similar problems on new projects. Donald W. Vannoy, Director of the Architectural and Engineering Performance Information Center at the University of Maryland, described how AEPIC functions and showed examples of the information that can be retrieved from the system. AEPIC has received data on 35,000 claims from a professional liability insurer and is actively soliciting claims information from many other sources in the building community. Vannoy expects the computerized retrieval system to be operational early in 1984 and accessible by remote terminal.

AVOID FAST TRACK CONSTRUCTION, HAVE SOLID FINANCING, GOOD INSPECTION, A CLEAR LINE OF RESPONSIBILITY TO AN INDIVIDUAL

One developer's opinion was expressed by Udo Walther of Trammel Crow Co. in Dallas. Walther feels that architects often promise to design a building to suit the developer's requirements but, in the end, design for themselves. He also believes that architects use too many consultants, resulting in divided responsibilities. Unqualified people in key positions is a common problem among all members of the design and construction team, according to Walther, and can be avoided with better training and more experience on the job.

A major financial investor in the U.S. construction industry enumerated many reasons for the decline in construction quality. Metropolitan Life Insurance Company's Vance Torbert, Jr. observed that QA problems are caused by owners who are inexperienced, underfinanced, and unrealistic; designers who ignore budgets, prepare inadequate plans and specs, have unqualified construction inspectors, do not coordinate their designs, and don't review shop drawings well; and contractors with poor project superintendents and poor scheduling. He recommends avoiding fast track construction, and recommends solid financing, good inspection, and a clear line of responsibility to a single individual.

Ineffective education was cited by some speakers as another contributor to the problem. Architect James R. Stefano, a partner in Skidmore, Owings & Merrill, stated that architectural schools are teaching fashion and uniqueness and not quality. William J. McKee, Jr. of NSPE PEPP, commented that engineering programs should be more relevant to construction and should be five years in duration.

Structural engineer Joseph Colaco of CBM Engineers, Inc., Houston, noted that building shapes are becoming more unusual and complex but that design fees have not increased accordingly. He also stated that assignment of responsibility is sometimes a problem, as in the case of window walls. Wall systems are traditionally the domain of the architect even though their performance is a major structural concern. Structural engineers should have some responsibility for window wall design, and be paid accordingly. Colaco cited floor deflections, axial column shortening on tall buildings, spandrel beam deflections and rotations, and temporary retaining systems which are left in place as among the most common causes of problems related to structural performance.

The effectiveness of independent design review was reported on by several speakers, including William

 October 1983

Building Design & Construction

November 1983

Cost/benefit analyses in exteriors, interiors, life safety, computers, energy conservation, mechanical/electrical systems

THE ANNUAL OF EMERGING TECHNOLOGY

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A/E data bank organizing for startup

Work is proceeding at the University of Maryland to develop a central repository for building performance information, with officials of the Architecture and Engineering Performance Information Center hoping to be ready to respond to inquiries by the spring of 1984.

By then, it is hoped that the center will be able to start accessing its computerized information files, according to John Loss, professor of architecture at the university's School of Architecture and co-director of the center.

The center already has more than 40,000 cases (incidents) stored in its computers. Before inputting more information, it is developing a more comprehensive report form. Loss believes the number of reports on file will rapidly rise to 500,000 or more once the center becomes operational and the data base expands.

The center is seeking annual contributions from associations and firms involved in the design and construction fields to help defray operating costs. An early contributor is Victor O. Schinnerer & Co., program administrator for professional liability insurance programs commended by the American Institute of Architects and the National Society of Professional Engineers. Schinnerer gave $5,000, the first of contributions it plans to make annually.

With the aid of contributions, the center hopes to keep access costs for the individual design professional "to no more than those we're currently aware of in other subsidized data systems," Loss said. He said these are in the range of $15 to $25 for prepared programs and $100 to $150 for custom searches.

Information to be "desensitized"

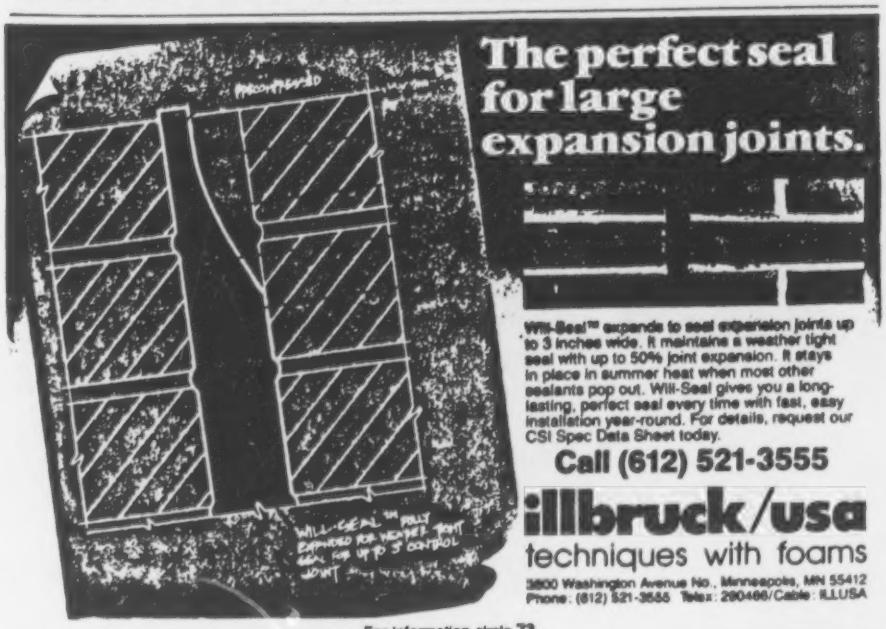
To encourage submission of information without the concern that it could be used against the submittor in legal action, the center will "desensitize" information that identifies actual buildings and persons involved in their design, construction and ownership. To accomplish this, confidential performance reports may be submitted through professional organizations acting as intermediaries.

All performance report data and document citations will carry a reporter number that will identify only the professional or technical category to which the submittor belongs, and note whether he has been involved with the specific performance events.

Reaction to the center from the architectural/engineering community has been "positive," Loss said.

Loss thinks that, in addition to architects and engineers, others who will find the center of value include contractors, developers, manufacturers, attorneys, building owners and users, federal and state agencies and insurance underwriters. Designers are expected to be interested particularly in data related to matters such as water penetration, moisture migration and foundation settlement, as well as procedural problems relating to design.

Persons interested in more information can write to Loss at the Architecture and Engineering Performance Information Center, 3907 Metzerott Rd., University of Maryland, College Park, Md. 20742. □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THOSE WHO MADE MARKS IN 1983

Many individuals in many ways served the best interests of the construction industry last year. Here are some.

Donald W. Vannoy, John Loss and **Neal FitzSimons,** seeing the Architecture and Engineering Performance Information Center, an archive for failure information, through its infancy.

Florida state **Sen. John W. Vogt,** writing and promoting a stringent construction inspection law.

Frank M. Holzmann, Texas highway department, and **Hugh E. Johnson** and **Jaime Gonzalez,** H.B. Zachry Co., completing a complex interchange one year early.

Harry Ratrie, Baltimore paving contractor, proposing an alternative to the required awarding of subcontracts to disadvantaged business enterprises.

Edward P. Mueller of New York State's Department of Transportation and environmental consultant **Gary J. Pierce,** pioneering in research for replacing freshwater wetlands lost to highway construction.

Exxon engineer **Robert S. Rugeley,** overseeing the elegant 10-second launch of a 1,078-ft guyed offshore production tower in the Gulf of Mexico.

Alexander M. Asemove, guiding Hennepin County, Minn., through a 10-year effort to develop a computer-based engineering design and data-management system.

Hal E. Stober, Ball, Ball & Brosamer, whose custom-built conveyor-loader cut excavation costs in half on a Central Arizona Project canal segment.

Ernest S. Loh, T.Y. Lin International, and **Hisashi Daiguji,** Harumoto Iron Works, Osaka, devising an erection scheme that put a five-span tied-arch bridge in place without falsework in Taiwan.

Abel Wolman, warning from within the waterworks fraternity on the threat of toxic organic chemicals to drinking water.

Raymond J. Donovan, Secretary of Labor, taking the first steps to revise the Davis-Bacon Act.

James M. Shilstone, Dallas consultant, focusing attention on quality assurance in construction.

Jack M. Owens, Morrison-Knudsen, directing the emergency driving of a rail tunnel past a Utah rockslide in eight weeks.

Rep. **Morris K. Udall,** shepherding a nuclear waste disposal bill through Congress to passage after 28 years of debate.

Consultant **Louis Berger** and computer whiz **Charles P.C. Tung,** developing and exporting to China an integrated, low-cost highway design program that runs on microcomputers.

Florida Power & Light's **William B. Derrickson,** guiding the second nuclear unit at St. Lucie to completion in six years.

Greiner Engineering Sciences' **James G. Lutz,** contractor Cianbro Corp.'s **Richard J. Dooley** and the Federal Highway Administration's **Frank D. Sears,** developing methods to re-deck a busy Potomac River bridge without disrupting traffic.

Skidmore, Owings & Merrill's **Raul de Armas,** adapting an untried engineering concept to create the first diagonally braced concrete tube building.

C.M. Robinson, Jr., Virginia Electric and Power Co., engineering replacement of a 70-ft section of a heat-deflected column while it was under 2.3 million lb of load.

Union leader **Joseph F. Maloney** and contractor **James A. Conant,** leading a broad national effort to make unionized construction more competitive.

Gerald M. Hansler, executive director of the Delaware River Basin Commission, getting four governors and New York's mayor to agree to a long-term solution to recurring droughts.

Yutaka Mochida, of Japan Railway Construction Public Corp., moving the record-length undersea Seikan rail tunnel out of trouble to holing through.

Yorio Shiokawa, Shimizu Construction Co., Ltd., Tokyo, adapting the industrial robot to construction.

Harry O. Reinsch, Bechtel Power Corp., putting himself and his firm on the line in an attempt to keep five troubled nuclear-plant projects alive.

Edward O. Pfrang, organizing a landmark conference that produced recommendations for preventing structural failures in buildings.

Saudi Maj. Gen. **Said Y. Amin,** running the world's largest airport construction program including the $3.2-billion Riyadh airport, finished ahead of schedule and on budget.

Contractors **David B. Perini** and **Michael K. Stephenson,** leading construction's successful fight for improved federal export financing.

J. David Holt, Cianbro Corp., placing 5,700 cu yd of premixed concrete overnight in 40 ft of fast-flowing water.

Jack G. Stevens, Dallas consultant, sounding the alarm about the construction flaws exposed by Hurricane Alicia.

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NSPE Issues 2 New Shows: History & Achievements

Two outstanding slide shows have been produced by NSPE in conjunction with the Society's 50th Anniversary celebration. One features the 10 Outstanding Engineering Achievements of the last 50 years—selected by NSPE for special recognition at the 1984 Winter Meeting. The other is a visual history of the National Society.

The achievements show runs 10 minutes and highlights these engineering feats: nylon; the first working nuclear pile; the ENIAC electronic computer; the transistor; the Boeing 707; the inertial navigational system; the telstar communications satellite; Apollo 11; the helium neon laser; and the implantable heart pacemaker. The show is available either as a 35mm slide show with audio cassette and script or on video tape. The cost for the slide show is $50 (NSPE members $45). The videotape cost is $45. When ordering videotape, indicate format.

The history show runs 15 minutes and takes viewers from the Society's founding in New York in 1935 up to present-day activities of the 80,000-member organization. The cost for the history slide show (with audio cassette and script) is $50 and the video cassette is also $50. When ordering video, indicate format desired.

To order either or both shows, contact NSPE Information Center, 2029 K St., N.W., Washington, D.C. 20006; (202) 463-2300. Please include a check or money order for the full cost with your order.

Failure Information System Gets Support from PEPP

NSPE's Professional Engineers in Private Practice (PEPP) division has become one of the first sustaining members of the recently established Architecture and Engineering Performance Information Center (AEPIC). The PEPP board voted $5000 in support for the center at its January meeting in San Francisco.

AEPIC is a computerized archive of "case studies" of structural performance. Located at the University of Maryland in College Park, the center serves as a major resource for professionals involved in conceiving, planning, designing, constructing, or operating projects.

The purpose of the center is to help design professionals avoid past mistakes by providing a centralized source of documentation on the historical performance of structures, systems, or materials.

More than 550 architectural and engineering firms have promised to provide case information for the AEPIC files, which now contain data on some 40,000 cases. The Victor O. Schinnerer insurance company has contributed information on 37,000 cases from its claim files and has promised to contribute more.

All case information in the AEPIC data base is "laundered" to protect the privacy of the involved parties. The center currently is seeking additional contributors of structural performance information from the architecture, engineering, construction, and insurance communities.

AEPIC has been supported for the past two years by enabling grants from the National Science Foundation. These grants run out at the end of June, and the center must become self-sufficient. Membership and data base user fees are expected to provide the necessary support.

In addition to PEPP, the American Society of Civil Engineers has joined AEPIC as a sustaining ($5000) member. "It is the support of groups like these that will be the key in gaining attention and credibility for our efforts," says AEPIC Director Donald Vannoy. "We hope other professional societies will follow [PEPP's] example and become sustaining members."

Individuals and small firms may join AEPIC as "regular" members for $100 per year. Larger firms may become $1000-per-year "charter" members.

Currently, use of AEPIC's files is restricted to the center's members. For a fee beginning at a minimum of $75, members may request a search of the AEPIC data base for information on a particular type of structure or material.

A brochure describing AEPIC's services and membership categories is available from Donald Vannoy, Director, AEPIC, 3907 Metzerott Rd., University of Maryland, College Park, Md. 20742; (301) 935-5545. Forms for reporting failure incidents for inclusion in the AEPIC archive also are available.

NSPE's

50th Anniversary in 1984

We'll be celebrating throughout the year from coast to coast. Come join us!

Still to come in our anniversary celebration is our big birthday bash at the NSPE Annual Meeting July 8–14 in ***Washington, D.C.,*** and a special ceremony in ***Kansas City*** September 20–21, commemorating the signing of NSPE's original charter.

6: NATIONAL AND INTERNATIONAL EXPRESSIONS
OF INTEREST IN AEPIC
(PARTIAL LIST)

MARTIN & CAGLEY MIDDLEBROOK

Ronald F. Middlebrook, S.E.
John A. Martin, S.E.
James R. Cagley, S.E.

30 August 1982

MR. DONALD VANNOY
Department of Civil Engineering
University of Maryland
College Park, Maryland 20742

RE: AEPIC

MR. VANNOY, Martin, Cagley & Middlebrook is very much interested in the establishment and development of the Architecture and Engineering Performance Information Center, now located in College Park, Maryland.

This firm has affiliated offices located in Florida, Arizona, California, Texas, Colorado, Nevada, and Hawaii, in addition to the office in Rockville, Maryland and could provide assistance in the local areas noted.

We would like to volunteer such assistance that may be helpful on this very worthwhile and long-overdue program.

We wish you and your staff success.

MARTIN, CAGLEY & MIDDLEBROOK

Edward J. Scullen, S.E.
Vice President for Special Projects

EJS:cm

Combustion Engineering, Inc.
1000 Prospect Hill Road
Windsor, Connecticut 06095

Tel 203/688-1911
Telex 9-9297

COMBUSTION ENGINEERING

August 6, 1982
MH82-042

Mr. Donald W. Vannoy
Department of Civil Engineering
University of Maryland
College Park, MD 20742

RE: Architecture & Engineering
Performance Information Center

Dear Mr. Vannoy:

We recently read about your newly-formed center (AEPIC) in "Engineering News Record." We are interested in finding out how we may obtain information regarding structural failures. Our specific interest is in overhead crane support structures.

Please address correspondence to me at:

Combustion Engineering, Inc.
Dept. 6518-BB2
1000 Prospect Hill Road
Windsor, CT 06095

Very truly yours,

A. P. Wivagg, P. E.
Corporate Manager, Material Handling

ktc

Ford Motor Land Development Corporation

One Parklane Boulevard
Dearborn, Michigan 48126

August 9, 1982

Mr. Donald W. Vannoy
Department of Civil Engineering
University of Maryland
College Park, Maryland 20742

Re: Architectural and Engineering Performance Information Center (AEPIC)

Dear Mr. Vannoy:

The formation of AEPIC as an archive to record architectural and engineering failures on construction projects will serve as an invaluable aid to all of us involved in the industry in years to come. In that regard, I am most interested in receiving information regarding procedures for submitting data to AEPIC for file, as well as, receiving case information on file at AEPIC, including charges associated with this service.

Please forward available information to my attention at the address on this letterhead.

Sincerely,

Ronald J. Gagnon
Director of Construction

'paw

SCHRODER ENGINEERING, P.C.
STRUCTURAL ENGINEERS

220 SOUTH WESTCOTT ST.
SIOUX CITY, IOWA 51107
PHONE 712 255-6161

August 9, 1982

Donald Vannoy
Department of Civil Engineering
University of Maryland
College Park, MC 20742

Dear Sir:

I am interested in contributing information to AEPIC.

Sincerely,

SCHRODER ENGINEERING, P.C.

Eldon L Schroder

Eldon L. Schroder, PE

ELS/vmb

August 10, 1982

A.E.P.I.C.
c/o Mr. Donald Vannoy
Department of Civil Engineering
University of Maryland
College Park, Maryland 20742

Gentlemen:

I recently read, in ENR, of the formation of A.E.P.I.C. and wish to commend you for your efforts. I am sure that the center will be a valuable resource for our profession.

I am writing to learn how the center will operate. How may I contribute, gain access to files, user fees, etc.?

Again, congratulations on bringing this project to fruition. I look forward to hearing from you.

Sincerely,

Robert M. Felton

Robert M. Felton, Project Engineer
Universal Engineering Testing Company

RMF:slh

3852 L.B. McLEOD ROAD•ORLANDO, FLORIDA 32805 (305) 423-0504

Robert Darvas Associates, P.C.
CONSULTING STRUCTURAL ENGINEERS
440 SOUTH MAIN STREET • ANN ARBOR, MICHIGAN 48104 • (313) 761-8713

ROBERT M. DARVAS, P.E.
THOMAS FITZPATRICK, P.E.
KENNETH J. WINTERS, P.E.
STEPHEN M. RUDNER, P.E.

August 10, 1982

Mr. Donald Vannoy
Department of Civil Engineering
University of Maryland
College Park, Maryland 20742

Dear Mr. Vannoy,

In the August 5th issue of Engineering News-Record, we read of your Architecture and Engineering Performance Information Center (AEPIC). As consulting structural engineers, we feel that we have had some experience which would be suitable for the AEPIC data base. We also feel that we could benefit from information submitted by others. As the procedures for submitting and extracting data are developed, would you please inform us of them. Thank you.

Sincerely,

ROBERT DARVAS ASSOCIATES, P.C.

Kenneth Good
Kenneth Good

WAGNER • HOHNS • INGLIS • INC. • CONSULTANTS TO THE CONSTRUCTION INDUSTRY
3043 FOOTHILL BLVD., LaCRESCENTA, CA. 91214-0437 • 213-248-2523

August 11, 1982

Donald Vannoy
Department of Civil Engineering
University of Maryland
College Park, Maryland 20742

Dear Mr. Vannoy:

I've read in Engineering News Record of your role in setting up the AEPIC.

My firm for nearly some 20 years has been a leading consultant in solving construction contract disputes. I've enclosed our brochure for your reference.

We get all sorts of insight into any number of construction failures. These include structural collapse, failure of heating, ventilating, air conditioning systems to work, the failure of projects to be done on time. In those nearly twenty years we've been involved with perhaps 2,500 construction contract disputes that have started off in arbitration or litigation. We've worked in all fifty states and in a number of countries overseas.

We have a staff of 120 people and we are very interested in the industry.

How can I help you?

Very truly yours,

WAGNER-HOHNS-INGLIS-INC.

H. Murray Hohns, P.E.
President

HMH:lds

Enclosure

EUGENE H. HARLOW, INC.
Civil Engineer
800 West Belt South
Suite 124
Houston, Texas 77042
(713) 266-0080

August 11, 1982

Architecture and Engineering Performance
Information Center
Department of Civil Engineering
University of Maryland
College Park, Md. 20742 Att. Mr. Donald Vannoy

Gentlemen:

ENR for August 5, 1982 suggests anyone interested in contributing information about failures should contact your new center. One of the most baffling problems facing coastal engineers is the design of large, deep water rubble mound breakwaters. The enclosed paper gives a small idea of the nature of the unknowns.

A.S.C.E. has a Rubble Mound Breakwater Committee, headed by Orville Magoon, P.O. Box 26062, San Francisco CA 94126.

PIANC (Permanent International Association of Navigation Congresses) has a Permanent Technical Committee II (for Ocean Ports and Saeways), which in turn has established a Working Group on Rubble Mound Breakwaters in Deeper Water to look into the same subject. It is gathering material on design and behavior, world-wide. I am the U.S. Representative on both of these.

Volumes have been written and extensive laboratory models studied in efforts to find out why some of these huge structures do not withstand major storms.

Is the Center interested in collecting this kind of data?

Very truly yours,

E. H. Harlow

E. H. Harlow

Interactive Resources, Inc.

117 Park Place
Point Richmond
California 94801
415-236-7435

Structural Engineers

John E. Clinton, SE
James S. Caid, SE
Roy H. Andrewson
Ralph Kratz
Edward H. Adamson

13 August 1982

Prof. Donald Vannoy
Dept. of Civil Engineering
University of Maryland
College Park, MD 20742

Dear Prof. Vannoy:

Congratulations on opening the Architecture and Engineering Performance Information Center (ENR, 8-5-82, p. 13).

I would appreciate receiving more information about AEPIC, including the methods of submitting and receiving failure information.

Thank you.

Sincerely,

Ralph Kratz, P.E.

RK/sb

MACCAFERRI GABIONS INC.
BOX 43A, GOVERNOR LANE BLVD., WILLIAMSPORT, MARYLAND 21795

TELEX: 893422

TELEPHONE: 301-223-6810

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August 16, 1982

Professor D. Vannoy
Department of Civil Engineering
University of Maryland
College Park, Maryland 20742

Dear Professor Vannoy:

I read with interest the report which appeared in ENR on August the 5th regarding the Architecture and Engineering Performance and Information Center.

I will be very pleased to assist by submitting information of the type required and have enclosed a report for possible inclusion in the archives.

I am, however, a little worried that by compiling a list of so called gabion failures we may deter people from the use of the product rather than instruct them on what should be avoided. This could perhaps be addressed by suitable titles in the indexes. For example, the report I have enclosed could be classified as a failure of gabions whereas it is my opinion the failure is one of supervision, since poor quality stone was used to fill the gabions which are themselves in perfect condition.

I would welcome an opportunity to visit you to discuss these problems further and remain,

Sincerely yours,

MACCAFERRI GABIONS, INC.

A. D. Crowhurst mmr

A. D. Crowhurst
Assistant to the President

ADC/mmr

Enclosure

LOREN C. KOLDITZ
Engineering Company
(618) 475-2544
PROFESSIONAL ENGINEERING SERVICE
BALDWIN ROAD, ROUTE NO. 1, BOX 302
NEW ATHENS, ILLINOIS 62264

August 23, 1982

Mr. Donald Vannoy
Dept. of Civil Engineering
University of Maryland
College Park, MD 20742

Re: AEPIC

Dear Mr. Vannoy:

The recent article in Engineering News-Record aroused my interest in AEPIC.

We are interested in natural gas pipeline failures and at times develop information pertaining to them.

Is it the intent that AEPIC maintain files that will include natural gas pipelines?

Sincerely,

LOREN C. KOLDITZ ENGINEERING COMPANY

L. C. Kolditz, P.E.

LCK/da

CTA Architects Engineers 1500 Poly Drive P.O. Box 1439 Billings, Montana 59103 (406) 248-7455

August 25, 1982

Donald Vannoy
Department of Civil Engineering
University of Maryland
College Park, MD 20742

Dear Mr. Vannoy:

Would you please forward to this office information regarding your Architecture and Engineering Performance Information Center. We would be most willing to supply information and would also be interested in receiving printouts of information that you store in your clearinghouse.

Sincerely,

CTA ARCHITECTS ENGINEERING

Gene L. Kolstad, AIA, PE

cj

MONTEMARANO
ASSOCIATES
CONSULTING ENGINEERS AND PLANNERS

August 25, 1982

Mr. Donald Vannoy
Department of Civil Engineering
University of Maryland
College Park, Maryland 20742

Dear Mr. Vannoy:

I am very much interested in the archive devoted to engineering and architectural failures, the Architecture and Engineering Performance Information Center (AEPIC), has opened at the University of Maryland Engineering School.

I would like to contribute information and would appreciate receiving details.

Yours truly,

MONTEMARANO ASSOCIATES

Joseph Montemarano, P.E.

JM/ba

1040 HEMPSTEAD TURNPIKE • FRANKLIN SQUARE, NEW YORK 11010 • (516) 328-1125

STATE OF ALASKA

JAY S. HAMMOND, GOVERNOR

DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

DIVISION OF DESIGN & CONSTRUCTION
BUILDINGS AND HARBORS
INTERIOR REGION

University Plaza West
600 University, Suite F
Fairbanks, Alaska 99701
Phone (907) 479-6252

August 26, 1982

RE: Architecture & Engineering
Performance Information Center

Dept of Civil Engineering
University of Maryland,
College Park MD 20742
ATTN: Donald Vannoy

Dear Mr. Vannoy:

The August issue of ENR Magazine contained an article on the Failure Archive proposed for the University of Maryland. Our department would appreciate receiving any information you could supply concerning inputting data into the file, retrieving data and the proposed fee structures. While many of our problems are a direct result of our arctic environment and therefore not of much interest to engineers and architects in the contiguous 48 states, we do have our share of leaking roofs and buckled floors resulting from poor specifications and/or construction procedures. Hopefully, others could learn from our mistakes and we could benefit from the mistakes of others.

Thank you for your time.

Sincerely,

Rod Platzke
Regional Design & Construction Chief
Buildings & Harbors
Interior Region DOT/PF

RP:hm

GLOBETROTTERS ENGINEERING CORPORATION

300 South Wacker Drive, Suite 580 • Chicago, Illinois 60606 • (312) 922-6400

September 16, 1982

Professor Donald Vannoy
Department of Civil Engineering
University of Maryland
College Park, Md. 20742

Dear Professor Vannoy:

We read with great interest on the article entitled, "Structural Failure Information compiled on Computer Base as design aid for A/E Firms," in Engineering Times, September 1982 (Article enclosed).

We are very much interested in using AEPIC's resources - a comprehensive collection of data on many types of Structure failures, for our engineering projects.

We appreciate if you could provide us with the AEPIC's data base information.

We look forward to hearing from you.

Sincerely,

Niranjan Shah, P.E.
Vice President

NS/sy

35-471 0 - 84 - 7

CITY OF PHILADELPHIA

WATER DEPARTMENT
MATERIALS TESTING LABORATORY
7th Street & Lehigh Avenue, Philadelphia, Pa 19133

WILLIAM J. MARRAZZO
Commissioner

September 17, 1982

Mr. Donald Vannoy
CE Department
University of Maryland
College Park, MD 20742

Dear Mr. Vannoy:

I read, with considerable interest, an article, in the September 1982 edition of ASCE News, on the recently opened Architecture and Engineering Performance Information Center. I would appreciate any information you could send on this subject and perhaps our municipal laboratory may be able to contribute worthwhile information in the future.

Sincerely,

John E. Durrant
Acting Chief, Materials Testing Laboratory

JED:na

-76

7D

O'BRIEN - KREITZBERG & ASSOC., INC.
1502 ROUTE 38 • CHERRY HILL, NEW JERSEY 08002 - 2287 609-667-9350

September 20, 1982

Donald Vannoy, Ph.D.
Architecture and Engineering Performance
Information Center
Department of Civil Engineering
University of Maryland
College Park, MD 20742

Dear Dr. Vannoy:

It was a pleasure speaking with you last Friday concerning the organization and work of AEPIC. We, of course, are interested in assisting AEPIC's efforts in any appropriate way possible and would like to be added to your source mailing list. Undoubtedly, our staff can make beneficial use of resources in the future.

You had mentioned AEPIC maintaining a consultant referral list and accordingly I am enclosing a current O'Brien-Kreitzberg & Associates, Inc. brochure for your file.

Very truly yours,

Michael S. Adams

Michael S. Adams, AIA
Senior Project Manager

Enc.

cc: J. O'Brien
J. Orr
W. Mikes

pd

SOIL EXPLORATION COMPANY
662 CROMWELL AVENUE
ST. PAUL, MN 55114
PHONE 612/645-6446

a sister corporation to TWIN CITY TESTING AND ENGINEERING LABORATORY INC

September 22, 1982

Professor Donald Vannoy
Department of Civil Engineering
University of Maryland
College Park, MD 20742

Subj: AEPIC

Dear Professor Vannoy:

We are interested in using AEPIC resources. Please put our name in your mailing list.

As mentioned in our telephone conversation today, we are also willing to contribute information to the data base.

Very truly yours,

Samuel Y. Ng, P.E., Ph.D.
Principal Engineer

SYN/rjs/2

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BUILDING DEPARTMENT

COURTHOUSE ANNEX #2, 205 S.E. JACKSON ST. • ROSEBURG, OREGON 97470 • 503/672-3311

October 1, 1982

Mr. Donald Vannoy
Department of Civil Engineering
University of Maryland
College Park, MD 20742

Re: A.E.P.I.C.

Dear Mr. Vannoy:

I would like more information on procedures to follow in using AEPIC resources or making contributions.

Any assistance you can give me will be appreciated.

Sincerely,

Larry Spielbusch

Larry Spielbusch, P. E.
Project Coordinator

LS:jn

SOILTEST, INC.
2205 Lee Street, Evanston, Illinois 60202 U.S.A. • 312.869.5500 • Telex 72 4496

ABELARDO LECHTER
President

October 14, 1982

Professor Donald Vannoy
Civil Engineering Department
University of Maryland
College Park, Maryland 20742

Dear Professor Vannoy:

I have learned with great pleasure of the establishment of the Architectural and Engineering Performance Information Center. I am sure the civil engineering profession will be greatly indebted to the work that the AEPIC will be doing.

I have been very much interested in promoting the idea of "engineering risk management" for civil engineering since I believe that many failures are the result of poor risk management. The areas of field and laboratory testing and the factors of "relevance" and "utility" are components of risk management that have not been fully analyzed by the profession. Most likely you have already decided to accumulate data on the number and type of tests performed in a given construction failure. This information would be of great value in the analysis of the factors of relevance and utility.

Let me assure you that Soiltest, as a company and through employee participation in various professional activities, will support the efforts of AEPIC.

Very truly yours,

SOILTEST, INC.

A. Lechter

AL/lbu

ALDEN E. STILSON & ASSOCIATES

November 17, 1982

Mr. Donald Vannoy
Department of Civil Engineering
University of Maryland
College Park, MD 20742

Dear Mr. Vannoy:

We would like to obtain some detailed information on the new Architectural Engineering Performance Information Center (AEPIC).

1. How extensive is your data base at present?
2. Does the data base cover structural failures only, or are mechanical, piping and process equipment failures also recorded?
3. What is the cost to use the system and how would we access it?
4. If we wish to contribute information to AEPIC do you have a standard format for data submittal?

We would appreciate your answers to these questions and any other pertinent information you can provide.

Very truly yours,

ALDEN E. STILSON & ASSOCIATES

Paula C. Ziebarth

Paula C. Ziebarth

PCZ/tkk

CONSULTING ENGINEERING & ARCHITECTURE
COLUMBUS OHIO CLEVELAND OHIO WHEELING W VA

170 NORTH HIGH STREET
COLUMBUS OHIO 43215
PHONE 614/228-4385

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REX E TUTTLE

The University of Mississippi
School of Engineering
University, Mississippi 38677

Department of Civil Engineering

(601) 232-7191

December 20, 1982

Archietecture and Engineering Performance
Center
University of Maryland
College Park, MD

Sirs:

Recently I was involved in investigating the failure of a steel frame building failed during erection. I would like to report this failure to the center and would like to receive any suggestions on the format in which this material to be written up.

I look forward to hearing from you.

Very truly yours,

K. P. George

K. P. George,
Professor

KPG:vcp

WOMEN'S CENTENNIAL
1882-1982

STATE OF CONNECTICUT

DEPARTMENT OF ADMINISTRATIVE SERVICES
BUREAU OF PUBLIC WORKS

January 6, 1983

State Office Building
Hartford, Connecticut 06115
203-566-3360

Engineering Performance Information Center
3907 Metzerott Road
University of Maryland
College Park, Maryland 20742

Sirs:

I would be most interested in learning more about the Information Center. The need has always existed, and made constantly more acute by the complexity of design and construction.

I wish you success.

Very truly yours,

RH Ronaldes.

Robert H. Ronaldes
Chief Architect
DAS/Bureau of Public Works
Design & Review
(Architectural Unit)

566-1500

RHR/mlb

Part P.E. article

GRESHAM, SMITH AND PARTNERS
3310 West End Avenue / Post Office Box 1625
Nashville, Tennessee 37~~203~~ 37202
615 385-3310

February 18, 1983

Dr. Donald W. Vannoy, P.E.
Director, Architectural Engineering
Performance Information Center
Department of Civil Engineering
University of Maryland
College Park, Maryland 20742

Dear Sir:

Would you send me information about the AEPIC, available information, and cost at your earliest convenience.

Thank you..

GRESHAM, SMITH AND PARTNERS

Frederick A. Weis, P.E.

Frederick A. Weis, P.E.

jmg

Mailed info packet 4/11/83

Alexander & Sanders Insurance Agency, Inc.

SIDNEY B. SANDERS, C.P.C.U.

P. O. BOX 15576
1956 DALLAS
BATON ROUGE, LOUISIANA 70895
924-1171

March 31, 1983

Dr. Donald W. Vannoy
Civil Engineering Department
University of Maryland
College Park, MD 20742

Dear Dr. Vannoy:

As an insurance agent directly involved with architects and engineers professional liability/loss prevention, I am very interested in the Architecture and Engineering Performance Information Center. Our agency provides services for architect and engineer clients throughout the state of Louisiana.

I am curious as to when the Center will be fully operational. Also, I would like information regarding publications you now have or will make available in the future.

I wish you and Mr. Loss success in your endeavors.

Kindest regards,

ALEXANDER & SANDERS INSURANCE AGENCY, INC.

Conrad Adams
Account Executive

CA/jak

THE ASSOCIATION OF
PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS
OF ALBERTA

TELEPHONE 426-3990

(ADMINISTRATORS OF "THE ENGINEERING, GEOLOGICAL AND GEOPHYSICAL PROFESSIONS ACT" OF ALBERTA)

1010 ONE THORNTON COURT
EDMONTON ALBERTA
T5J 2E7

April 12, 1983

Dr. Donald W. Vannoy, Ph.D., P. Eng.
Director, AEPIC
Department of Civil Engineering
College of Engineering
University of Maryland
College Park, Maryland
U.S.A. 20742

Dear Dr. Vannoy:

The Continuing Education Committee of the Association of Professional Engineers, Geologists and Geophysicists of Alberta is interested in receiving some correspondence regarding the current status of your Architecture and Engineering Performance Information Centre. In your letter of September 8, 1982 you indicated that you had just received 40,000 old cases and were in the process of cataloging and filing the information.

We also have discovered that insurance underwriters are a good source for obtaining case histories on such things as failures and poor professional conduct. We are now endeavouring to publish one a month in our APEGGA Newspaper. We would appreciate it if you could advise us as to how we could obtain information on various subjects from your repository and in what form it could be obtained. If a Canadian repository has been established we would also appreciate information on its location and operations.

Sincerely,

Stanley H. Ainslie, P. Eng.
Chairman, Continuing Education Committee

SHA/ulj

Send -
- Committee letter
- Enclosures
- Forms + Letter.
D.

HANSEN ASSOCIATES
ARCHITECTURE - PLANNING
ROBERT E. HANSEN, F.A.I.A.
LEO HANSEN, A.I.A.

May 9, 1983

Dr. Donald W. Vannoy & John Loss, Directors
AEPIC Center
University of Maryland
College Park, Maryland 20740

MEMORANDUM:

Mr. William Hooper of AIA recently sent me a VOS flyer on AEPIC - certainly a big step in the right direction.

Here we have a special interest in performance under high wind conditions; mine began with the great 1926 hurricane in South Florida.

We have experiences and rudimentary testing, relative to roof uplift, and *glazing systems, which may be of interest.

An inspection team report on Hurricane Donna (1960's, Florida Keys) was never published for lack of verification of opinions and observations.

We would like to share in the experiences of others and would appreciate knowing how this might be done.

I have been thoroughly convinced for a long time that there must be a coordinated research and testing program for building construction (including product testing) supported at all levels, and that our professions share in dereliction of leadership for the fact that there is no such coordinated systems now.

Please advise how I may be helpful.

Robert E. Hansen, F.A.I.A.

*For a project, we made informal but effective tests in 1964 which indicated the keeping margins of standard alumium glazing systems then available were not adequate for high wind conditions - Had there been a 'non attributable' way of sharing this informal information, the later expensive and embarrassing 'Plywood Plaza' incident might not have occurred.

311 S.E. 16th AVENUE, FORT LAUDERDALE, FLORIDA 33301 (305) 463-8568
114 LAUREL DRIVE, HENDERSONVILLE, NORTH CAROLINA 28739 (704) 692-8385

SMITH, SOMERVILLE & CASE
ATTORNEYS AT LAW
SIXTH FLOOR · 100 LIGHT STREET
BALTIMORE, MARYLAND 21202
TELEPHONE (301) 727-1164
CABLE ADDRESS "CLARKLAW" · TELEX 908068

June 15, 1983

Dr. Donald W. Vannoy, Ph.D., PE
Director, AEPIC
University of Maryland
College Park, Maryland 20742

Re: Our File: 4950-1

Dear Dr. Vannoy:

Your talk at the meeting of invited attorneys in Colorado was most interesting. I believe your program will be quite helpful to the design profession at large and to those of us who have to defend them after problems develop. I am looking forward to the complete institution of your program.

As your concept will be very useful in defending design professionals and helpful in engaging a loss prevention programs for the design professionals we generally represent, I support your efforts and volunteer to participate in any way I can be most helpful. The experience I have had over the last 18 years of practice working with design professionals has taught me the value of such ideas as yours.

Very truly yours,

Douglas G. Worrall

DGW:sph

Fédération Internationale des Ingénieurs Conseils

International Federation of Consulting Engineers

Internationale Vereinigung Beratender Ingenieure

From the office of:
Chairman of the Standing Committee on Professional Liability.

'Bearna',
Thormanby Road,
Howth, Co. Dublin,
Ireland.

Please file letter.

13th July, 1983

Dr. Donald W. Vannoy,
Architecture and Engineering
Performance Information Centre,
University of Maryland,
Building 332, College Park,
MD 20742,
U.S.A.

Dear Dr. Vannoy,

I have just been given a report on some professional liability claims modelled on our own Standing Committee's report of 1983. A copy of this report is enclosed herewith should you be interested in keeping it within your records.

May I take this opportunity to thank you formally for inviting me to attend the AEPIC Conference, which was very interesting and instructive, and also for offering the grant of $600 without which I would not have been able to participate. I have already made my report to FIDIC on the excellent project you are involved in and it remains to be seen whether or not they decide to sanction any involvement in the project.

Best wishes and regards.

Yours sincerely,

Dr. Nael G. Bunni

NRMCA
NATIONAL READY MIXED CONCRETE ASSOCIATION

900 Spring Street, Silver Spring, Maryland 20910
Telephone: (301) 587-1400

August 9, 1983

Mr. John Loss, AIA
Co-Director
Architecture and Engineering
Performance Information Center

Mr. Donald W. Vannoy, Ph.D, P.E.
Co-Director
Architecture and Engineering
Performance Information Center

Gentlemen:

I have your letter of July 28 to Ken Tobin relative to service on AEPIC Advisory Committees. If possible, I would like to serve.

Yours truly,

Richard D. Gaynor, Vice President
of Engineering and Research

RDG:sfh

Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS

September 1, 1983

Dr. Donald W. Vannoy
Civil Engineering Dept.
University of Maryland
College Park, MD 20742

Dear Dr. Vannoy:

We have been reading about the newly created "Architecture and Engineering Performance Information Center" of which we understand that you are a co-director. Burns & McDonnell is interested in this project and we believe it will be of great benefit to the Engineering and Architectural professions.

We would appreciate very much to learn more of AEPIC's progress and to find out when reports will be available and how they might be obtained. We might also be interested sharing our experiences with others, should you desire expanded participation by Consultants. Would you please send us any available literature concerning the Center that you have available? Thank you very much.

Sincerely,

Ben Anderson

Ben Anderson, P.E.
Director of Technical Services

HBA/vc

4800 EAST 63rd STREET, P.O. BOX 173, KANSAS CITY, MISSOURI 64141 • TEL 816-333-4375 TWX 910-771-3069

35-471 O - 84 - 8

Serving the Nation's Housing and Community Development Needs

October 3, 1983

Mr. John Loss, AIA
Co-Director, AEPIC
Architecture and Engineering
Performance Information Center
University of Maryland
3907 Metzerott Road
College Park, Maryland 20742

Dear Mr. Loss:

In response to your request for a recommendation of someone to serve on your Advisory Committee, I would recommend Mr. Jack Herrington. Mr. Herrington is Executive Director of the Housing Authority of the City of Dallas 2525 Lucas Drive, Dallas, Texas 75219; 214/526-8581.

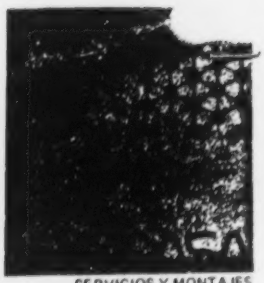
Please let me know if I can be of further assistance.

Sincerely,

Robert W. Maffin
Executive Director

– add to Committee list –
– Send forms + letter!
J. sent Nov. 9, 1983

National Association of Housing and Redevelopment Officials
2600 Virginia Avenue Northwest Suite 404 Washington D C 20037 (202) 333-2020



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UNIVERSITY OF MARYLAND
Architectural and Engineering Performance
Information Center
Building 332
3907 Metzerott Road
COLLEGE PARK, MD 20742.
U. S. A.

BARCELONA, SPAIN 11/28/83.

Dear Sirs:

We are interested to receive information about your services. Please, send us brochures and literature of your activities, especially on AEPIC Database.

Looking forward for your news, we remain

Yours faithfully.

Pedro Uriarte.

Mercantil de Barcelona. Libro de Sociedades, tomo 2.591, folio 49, hoja 27.549. Fecha 28 de Noviembre de 1974

November 17, 1983

Professor John Loss
Architectural and Engineering Performance
Information Center
3907 Metzerott Road
University of Maryland
College Park, MD 20742

Dear Professor Loss:

Your work in the Performance Data Bank, as reported in the November BUILDING DESIGN CONSTRUCTION magazine struck a responsive chord. This wasn't my first knowledge of your work, but it was the first real awareness of its possibile impact. I've felt the need for this kind of data for almost 20 years; in fact, tried to get something similar started in New York, without success. Perhaps, the time is now.

I would like to see how we in Georgia could work in this data system. Next year, I will be president-elect of the Georgia Association, A.I.A., and could influence some action toward participation in some manner. Let me know more details and what action you would recommend to expand this program.

Congratulations on having developed this Performance Information Center to this point. Please let me know what we can do.

Very truly yours,

Ray E. Cumrine, AIA

REC/pt

IPG, Incorporated / Architects and Planners / Post Office Box 2007 / Valdosta, Georgia 31601 / (912) 242-3567
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Executive Director

Jerome J. Walkowski
Director Architectural and Technical Services

Telephone 608/266-6884

November 17, 1983

Mr. John Loss, AIA Director
Architecture/Engineering
Performance Information Center
University of Maryland
College Park MD 20742

Dear Mr. Loss:

At a recent seminar, Hugh Miller - President of the Foundation for Preservation Technology displayed a great deal of interest in your endeavor to form a national clearinghouse for construction related problems.

I am most interested in participating in the crossflow of information which I feel could be of mutual benefit. Enclosed is a copy of an article which appeared in the November 1983 issue of Wisconsin Energy News. Unfortunately, I received it six months after this Authority replaced a similarly constructed defective roof.

I am sure that this problem of an inadequate flow of timely information exists across the country. Hopefully our 138 project database may contribute as well as benefit from a national database of experience.

I would appreciate being placed on your mailing list.

Sincerely,

Jerome J. Walkowski, AIA
Director of Architectural
and Technical Services

JJW:jml

enclosure

Rt 7 Box 28. Tyler Texas 75707

NATIONAL SYSTEM ENGINEERING

Phone (214) 566-1980

December 27, 1983

Donald W. Vannoy P.E.
AEPIC
3907 Metzerott Rd.
University of Maryland
College Park, Md. 20742

Dear Mr. Vannoy:

I read your article in PE Magazine concerning A/E failures. Much of our firms activity is forensic engineering, thus we investigate some A/E typle failures as well as many other types.

Please forward additional information and forms for reporting failures.

Very truly yours,

Frank H. Johnson, CSP, PE
President

dj

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William F. Small
Adrian P. Reddy
Hugo C. Huettig III

20 January 1984

Architectural and Engineering Performance
Information Center
University of Maryland
College Park, Maryland 20742

Attention: Professor Donald W. Vannoy, Director

Gentlemen:

Please forward information on AEPIC.

I am specifically interested in the following:

1) individual and corporate membership; and

2) membership access to the Center's computer through telephone port.

Additionally, I have an interest in becoming one of your regional reporters.

Very truly yours,

William Loring Hobbs

William Loring Hobbs

WLH:njc

344 East Wisconsin
Lake Forest, Ill. 60045
Ph. 312 234 1607

SERENA-STURM ARCHITECTS INC.

29 January 1984

Mr. John Loss
AEPIC
University of Maryland
3907 Metzerott Road
University of Maryland College Park
Maryland 20742

Dear Mr. Loss,

We recently read an article in an A/A newsletter written by a Chicago Lawyer, Paul M. Lurie, on AEPIC.

Our firm is interested in receiving more information about the service you offer, cost, and do you plan to set up a regional repository in the Chicago area.

Thank you,

Serena/Sturm Architects

Marty Serena

MS/mc

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DIRECTOR OF PROJECT DEVELOPMENT
RAYMOND J. KINLEY, JR.

January 31, 1984

AEPIC
3907 Metzerott Road
University of Maryland
College Park, MD 20742

Dear Sir:

After reading the ASCE's "Civil Engineering" magazine article on AEPIC, it stated that there are several committee's established.

I would like to obtain a description of the roles each committee has and how it functions. The role of the volunteer is also of importance to me as I am interested. Can you tell me if there are any qualifications? What is the process involved in volunteering my time and services?

Thank you for your time.

Very truly yours,

CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS & PLANNERS

Raymond Kovachik

Raymond Kovachik

RK/pr

NSPE PEPP Professional Engineers in Private Practice

18.10

February 2, 1984

Donald W. Vannoy, Ph.D., P.E.
Architecture and Engineering Performance
Information Center
University of Maryland
3907 Metzerott Road
College Park, Maryland 20742

Dear Don:

Enclosed is a check in the amount of $5,000. It is PEPP's contribution to AEPIC and represents a significant statement of commitment to and support for that organization.

The decision was not made without considerable discussion both on the Professional Liability Committee and subsequently on the Executive Board which made the final decision. Some of the concerns you have heard before were raised and given a complete airing. In the final analysis, however, while there was and remains an attitude that AEPIC may have its down side for the profession, the potential for its contribution to improved practice and A/E defense makes this a very worthwhile organization. It is certainly, in the view of the leadership, one worthy of PEPP's support at this time.

Sincerely,

Jack L

W. J. McKee, Jr., Staff Director
Professional Engineers in Private Practice

WJM/ma

cc: Howard Sherman, P.E.
Richard Pettigrew, P.E.
David Lillard, P.E.
J. Sprigg Duvall, Esq.

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February 10, 1984

Mr. John Loss, Director
AEPIC
University of Maryland
3907 Metzerott Road
College Park, MD..20742

RE: Information AEPIC Project.

Dear Mr. Loss;

In a recent technical publication and also in our industry, I have become aware of the University's compiling information under the title "Architecture and Engineering Performance Center". I am and Architect-Builder/developer of expensive residential homes in the suburban Philadelphia to Delaware area, with a great active involvement in real estate inspections of generally all types, ie: Commercial, Residential, and Industrial buildings and properties. I have been involved in this comprehensive inspection and evaluation type work for several years and as of the last year or so have had a much greater and intense up-turn in the interest and request for our service, and I feel that the information your project has compliled could be of importance to us.

Please forward to my attention at your earliest convenience any and all the facts you can provide as well as your findings..... I am very interested and thank you in advance for your help in the forwarding of the same to me, and I am with interest,

Very truly yours,

William F. Carr, Jr.
President

WFCjr:v

JOSEPH S. WARD, P.E.
CONSULTING GEOTECHNICAL ENGINEER
Specializing in Forensic Engineering

JOSEPH S. WARD, P.E.
CONSULTING GEOTECHNICAL ENGINEER
Specializing in Forensic Engineering

18 Lackawanna Plaza P.O. Box 1234
Montclair, N.J. 07042 (201) 744-4020

February 15, 1984

Dr. Donald W. Vannoy
AEPIC University of Maryland
College Park, Maryland 20742

Dear Dr. Vannoy:

It would be appreciated if you would forward me information concerning membership and report requests for AEPIC.

As a consulting geotechnical engineer, specializing in forensic engineering, I believe that the services the Center offers will be valuable to me in my practice.

Sincerely,

Joseph S. Ward, P.E.

JSW:vt

cc: Mr. Neal FitzSimons

WESTERN
TECHNOLOGIES
INC.

3737 East Broadway Road
P.O. Box 21387
Phoenix, Arizona 85036
(602) 268-1381

Mr. Donald Vannoy, Director
AEPIC
3907 Metzerott Road
University of Maryland
College Park, Maryland 20742

March 21, 1984

Dear Mr. Vannoy:

Per an article in ENGINEERING TIMES, please send me your brochure describing AEPIC's services and membership categories.

Also, I would be interested in one of the forms for reporting failure incidents for inclusion in the AEPIC archive.

Thank you for your kind attention to this request.

Respectfully,
WESTERN TECHNOLOGIES INC.

Edward Mangotich, P.E.
Principal

nj

Duke University
School of Engineering
DURHAM, NORTH CAROLINA 27706

DEPARTMENT OF MECHANICAL ENGINEERING
AND MATERIALS SCIENCE

TELEPHONE (919) 684-2832

March 26, 1984

Mr. Donald Vannoy, Director
Architecture and Engineering
Performance Information Center
3907 Metzerott Road
University of Maryland
College Park, MD 20742

Dear Mr. Vannoy:

I read with interest about AEPIC in a recent edition of Engineering Times. We teach a course in Failure Analysis and Prevention at Duke University, and it is structured around case studies. Therefore I would appreciate receiving information from you on AEPIC's services, membership categories, and needs. Although most of the failures we investigate are not architectural structures, some of our case studies may still be of interest to you and the Center. In turn, I would like to expose our students to more large-scale structural failures.

If you have given any thought to fostering cooperative arrangements with universities, I think Duke University would be a prime candidate. We have a strong program in structural mechanics (including fracture mechanics as it relates to design) in Civil and Environmental Engineering, as well as a four-faculty group specializing in fractography (of metals and nonmetals) and failure analysis in this department.

Very truly yours,

George W. Pearsall

George [redacted] Pearsall
Professor

GWP:dg

March 29, 1984

HEERY

Mr. Donald W. Vannoy
AEPIC
Department of Civil Engineering
University of Maryland
College Park, MD 20742

Dear Mr. Vannoy:

I recently read the article "Counseling Subordinates" in Sweet's Topstory. I am interested in AEPIC membership, participation and available services. I would greatly appreciate you sending me any information available concerning all three of the above issues.

Thank you very much.

Sincerely,

HEERY & HEERY

Tom Coakley

TC:kj

J.L. COPELAND, INC.

6075 CLEVELAND AVENUE • COLUMBUS, OHIO 43229
P.O. BOX 29608 614-895-7339

April 4, 1984

AEPIC
3907 Metzerott Road
University of Maryland
College Park, Maryland 20742

ATTN: Mr. Donald Vannsy

Gentlemen:

Please send me information regarding your services and membership categories. Also, please send me a sample of the forms you use for reporting failure incidents.

I do failure analysis and expert testimony for law firms and insurance companies, and would like to know more about AEPIC.

Thank you.

Sincerely,

J. L. COPELAND, INC.

Jeffrey L. Copeland, P.E.

JLC:lkm

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13 Apr

Mr. GORE. Thank you very much. We certainly appreciate your testimony.

How did the idea for AEPIC evolve? Could you tell us that?

Dr. VANNOY. Maybe I should have Mr. FitzSimons address that——

Mr. GORE. OK.

Dr. VANNOY [continuing]. Since he has been very active from the early 1960's on the idea.

Mr. FITZSIMONS. Basically, sir, from my own personal viewpoint, back in 1964 I proposed to the American Society of Civil Engineers the establishment of a Research Council on the Performance of Structures. It was established and during the first meeting of this performance council, which was under an engineering foundation grant, it was decided that one of the most important activities that ASCE could undertake would be the establishment of, at that time, EPIC, which was the Engineering Performance Information Center. So the roots of this specific organization go back to 1964.

In 1968, the ASCE did make these recommendations and it's been a rather difficult row to hoe as your staff people can tell you, because when one deals with failures, one finds embarrassment, legal obligations, et cetera, but very fortunately, after this 1968 meeting, we met at various universities. Each one in turn was interested in helping us get started. On the other hand, there were problems of financing, and it wasn't until 3 years ago, when we worked out an arrangement with the National Science Foundation and, fortunately, the University of Maryland, to include an architectural component. And as of 1982, we had our first glimmerings going.

Mr. GORE. When does your National Science Foundation funding run out?

Mr. FITZSIMONS. In 2 months, sir.

Dr. VANNOY. It was granted from July 1, 1982, for 2 years. It will end July 1, 1984.

Mr. GORE. And what about future funding needs?

Dr. VANNOY. Well, AEPIC is envisioned to be a nonprofit, self-supporting organization.

Mr. GORE. Right.

Dr. VANNOY. That is our goal.

Mr. FITZSIMONS. We've succeeded in being nonprofit.

Dr. VANNOY. Yes——

[Laughter.]

Mr. VANNOY [continuing]. That part was easy. What we have tried to do is in the brochure, establish a membership fee and a search fee. However, we anticipate that those fees will not keep us self-supporting for a period of time. So we are going to have to depend, as in the brochure says, upon such governmental agencies, for example, or professional societies being a sponsor or patron of AEPIC to get it off the ground and over the hump because, as we told the National Science Foundation, it was almost impossible to sift the data format, the way in which you want to collect the data and disseminate it, and to build all the computer software on which you do the searches and get everything on line and users in 2 years. It was almost impossible, but we have come a long way.

However, I think it will still be 3 years before we could ever be self-supporting.

Mr. GORE. Do you think you could serve as a repository for the National Bureau of Standards?

Dr. VANNOY. I think we would be an ideal repository, as I said, for not only the National Bureau of Standards, but foreign countries as well. I think the idea here is that there is information that we have—that can be shared by a lot of people. Most of our data—you know, like, will come from the professional practitioner. That does not get published, but some of the most valuable reports we have are from NBS.

Mr. GORE. How can Federal agencies that investigate failures, such as the Corps of Engineers, best support your data-gathering efforts?

Dr. VANNOY. No. 1, the best thing of any Federal agency, whether it be HUD, Veterans' Administration, or any of them, if they would use our reporting forms—

Mr. GORE. OK.

Dr. VANNOY [continuing]. Every time they had a problem, from roofing—not just structural collapses—we're talking about performance, that is, roofing problems, water penetration problems in the wall, settlement problems. If they took the time to fill out the forms and send them to us, we could actually then key in that—we could build them an in-house data base, which I think could pay for itself because if you eliminate, as you know, if they could share the information and eliminate one—one small problem, it would pay for the system itself.

Mr. GORE. Well, perhaps with the National Bureau of Standards taking the lead in this, we can better coordinate what the Government as a whole does in investigating structural failures and learn from mistakes easier.

What—can you tell me a little bit about what is done in Canada and in the United Kingdom?

Dr. VANNOY. OK. Basically, we met last June 1983—representatives from several foreign countries. What had to be done first was to develop the reporting mechanism; what forms would be used; what the format should be. Representatives from Canada, United Kingdom, and several other foreign countries were there who wanted to establish a repository there.

So the formats and forms have been developed. We are now in the process of shipping them the forms and having them set up a repository like ours using the same reporting mechanisms and format. So right now, they are in the process within those countries to use our forms. This is the whole key that—the key of collecting information is what format it should be in so that you can use it so you avoid the garbage-in/garbage-out thing.

Dr. Loss. The thing that should be pointed out, Congressman Gore, is that the programs that are being developed in Canada are being developed through the National Research Council with David Allen——

Mr. GORE. Yeah.

Dr. Loss [continuing]. Whereas we are normally thinking in terms of some university-based or some of the organizations that could be at least neutral and nonbiased in developing their data re-

positories. It is with Ian McCloud at the University of Strathclyde in the United Kingdom that we're working there.

Most of the contacts that we are maintaining and developing for the development of the international repositories are through universities.

Mr. GORE. Yes.

Mr. FITZSIMONS. We are also coordinating our work with the equivalent professional groups, such as the Institution of Structural Engineers in Great Britain, the Institution of Civil Engineers, the Canadian Society of Civil Engineers and so forth. So we're working with the universities because they are a natural depository, but on the other hand, we are working with the professional groups to make sure we have complete coverage.

Mr. GORE. Well, that is very interesting. Let me recognize Mr. Skeen now.

Mr. SKEEN. Thank you, Mr. Chairman, and I am a little astounded to find that we're at this late date coming to an idea that's probably long past due its time. And I want to commend the professional societies for one to finally getting together to decide that we're going to do something about data base on structural failures and because with the advancement of materials and technologies and so forth, it is probably long overdue.

And so I just wanted to say that I think it's a time—or it's a development whose time is here, and we inserted language in the report from one of the National Science Foundation bills to the Bureau of Standards charging them with the responsibility of collecting data and so forth, and I am particularly happy to see the cooperation and that's what it is going to take, an awful lot of cooperation, not only nationally, but internationally.

I think it's a very progressive and a forward step in this thing. I commend all of you and I don't see any reason why the engineering societies, the structural and materials groups throughout the United States can't work with the Government groups, such as the National Bureau of Standards. And the question here about being a repository, it would seem only a natural and a natural, linkage for information.

So, I have nothing but praise for the idea. I just think that we're a little late getting around to it and I understand the turf situations, too. Also, I understand that we don't like to admit that—we're kind of—engineers are kind of like doctors; they don't like to admit that they make mistakes, but ours are much more visible sometimes than some of those in medicine.

So take my commendation and I certainly think that it's time that we got something done in this particular area.

Thank you, Mr. Chairman.

Mr. GORE. Luckily Congressmen don't make any mistakes, so we don't——

Mr. SKEEN. We make ours, but then they become a national——

[Laughter.]

Mr. SKEEN [continuing]. And we explain ours away.

Mr. GORE. I might say that in addition to those comments, that Chairman Doug Walgren did an excellent job in marking up the legislation involved here and put money back in for the Center for Building Technology as well. And our indications are that in the

other body, which is the way we refer to the Senate here, the—there is a good deal of support for this concept on a bipartisan basis. So I am very encouraged about it.

Mr. McCandless.

Mr. MCCANDLESS. Thank you, Mr. Chairman. I apologize for my lateness. The Red Eye from California didn't get in on time and here I am.

I found this subject very interesting in bringing myself up to date relative to the previous hearings at a time when I was not privy to be on the subcommittee. The one question I have of you gentlemen is, having come from county government, where building and safety codes and their implementation, examination, all are a part of the daily activity of that level of government, are we here possibly creating something other than just a resource?

Are we beginning to look at this from the point of view of the State of California with its building code, county of Riverside or San Francisco with its building code, augmentation—it's not adequate to protect the public from the professionals who sign off on a series of plans and specifications and put their license on the line as—as professionals?

Mr. FITZSIMONS. Sir——

Mr. MCCANDLESS. If any of you have any thoughts on that, I'd be interested in it.

Mr. FITZSIMONS. Yes; we have very specific thoughts on it, sir. As a practitioner, I must work within the codes and I've worked on code committees and so forth. And it is one of the important tenets and programs of this EPIC to cooperate with the code-writing agencies to help ensure that they have the best available information to write their decisions.

We also have worked and have been encouraged by many of the building officials that if—and I hope I can say really when this gets started—that they can, in fact, adopt the forms which we're using which will be to the mutual benefit of all.

So there's not only no conflict here; there's definitely a symbiotic relationship between our data gathering and the interaction with the codes, and if you look at your brochure, you'll see that the top committee in our group is codes and specifications, which is one in which we want to work with the bodies you just suggested through their organizations, to ensure that this information is not only disseminated to private practitioners such as myself, but also to code-writing bodies.

Mr. MCCANDLESS. There is an annual meeting of the Building and Safety Directors Association of some type that gets into the—what they consider to be the previous year's shortcomings or the needs to revise the code as a result of experience, whatever, and that's the chief reason for this annual meeting. Is the meeting that you're referring to, of city, county, and State officials who meet on a national basis? Is that the one you're talking about as far as the input is concerned?

Mr. FITZSIMONS. It isn't the one, sir. I must say that just this past week, I was on the telephone with Bob Spangler, who is the technical director of the coordinating group between the Uniform Building Code, the Southern Building Congress, and the International Building Code——

Mr. McCANDLESS. Yes.

Mr. FITZSIMONS [continuing]. And we're trying to coordinate with as many of these groups as possible. And very fortunately, this committee meeting acted as a catalyst for the—a Governors-based building code group. So, in answer to your question, I don't know that specific committee, but would be—I mean, meeting, but we'd be delighted to meet with them and share what we're doing.

Mr. McCANDLESS. It is my understanding that a part of that activity on an annual basis is a review in the area in which we're discussing here, the structural failures and the scenario on why and what might result in the way of uniform code adjustments to reflect these failures.

Do I have the right feeling toward this—this type of a seminar?

Mr. FITZSIMONS. There are seminars like that. We've had two in the past year, sir. The one you're specifically referring to, I must admit I'm not aware of.

Mr. McCANDLESS. The Association of Engineers and Architects gets into this rather in depth on an annual basis, from my understanding, knowing a couple of engineers. At least they tell me they go off somewhere and talk about problems in common——

Mr. FITZSIMONS. Yes, sir.

Mr. McCANDLESS [continuing]. Windows falling out and earthquake shearing and that kind of thing.

Dr. LOSS. Yes, sir, I'd like to share a little bit of my personal experiences in relationship to your question, sir. I've been working with the American Institute of Architects Codes and Standards Committee for the past several years. I've lectured and participated in some of their meetings which are held around the United States when they're—within which the architects, at least, can address these issues of codes and standards.

One of the difficulties that has been identified is that though the model codes do a very good job in trying to maintain a current assessment of what those standards mean, as we become more aware of performance of the buildings, we find that there is a significant amount of data, just a phenomenal amount of data in detail, that a limited committee is then expected to try to monitor. And in some instances, we find that the way the committees for code advising are established within the profession, at least within the AIA, in some instances, there might be only one person to represent a particular arena or issue.

And one of the objectives that we had with AEPIC is that by having this computer-based resource, it would simply expand the knowledge of those individuals who are contributing so much of their time to attempt to make these model codes effective and simply provide a more current and more broad-based data base for those individuals to use.

Mr. McCANDLESS. Is there a large variation in the uniform code between States—your assessment or your observation? Are we getting closer and closer to a national uniform code or do we have tremendous variations between jurisdictions still?

Dr. LOSS. Well, the actual model codes, from my experience, are becoming, I think, more standardized in their understandings, but it's still possible for the local State jurisdictions to vote their options in and accept or rescind parts of those model codes.

When I was practicing in North Carolina, I know that when their opinions were that the 1976 Uniform Building Code was too stringent for some of the issues that they wished to address, they simply did not accept or adopt portions of that Uniform Building Code as their model code for the State and kept the 1973, so they have this local option in most instances.

Mr. McCandless. Uh-huh.

Dr. Loss. So I think the model codes have been doing an excellent job in recent years in addressing these issues.

Mr. McCandless. Yes, it's a jumping-off point is what you're saying——

Dr. Loss. Either up or down or however the local jurisdiction wants it?

Dr. Vannoy. Yes, because, as he said—John said—that, for example, local jurisdictions may have a heavier snow load geographically than—so they have to make local exceptions for their particular concerns, whether it be maybe seismic or snow loads.

Dr. McCandless. Uh-huh. We have earthquakes instead of snow.

Mr. Vannoy. Yes. One of my concerns is there is a tendency to lighten the requirement sometimes, rather than make them heavier. I think that we should look at the model code as a reasonable standard for minimum standards, which is the general understanding of codes, but I'm quite disturbed when some of the local jurisdictions for, I think, quite unprofessional reasons, make decisions to either eliminate or reduce those standards.

Mr. McCandless. Right.

Thank you, gentlemen. Thank you, Mr. Chairman.

Mr. Gore. Well, thank you, thank you very much. Your testimony is—is very, very helpful and I want to congratulate you on the work that you have done and are doing and on the initiative that you took. This is something that is obviously needed. It should be coordinated.

The Federal agencies that investigate major structural failures ought to be required to cooperate in the construction of a data base that's easily accessible to architects and engineers so that the industry generally—and we as a country—can learn from past mistakes and so that, for example, codes can—can be improved, as Mr. McCandless was pointing out.

So I think we're off to a good start.

Mr. Reid, do you have any questions for these witnesses?

Mr. Reid. No, Mr. Chairman.

Mr. Gore. All right.

Let me again congratulate you on what you're doing, and I want to tell you that we are interested in working with you. I am very hopeful that the legislation developed by the subcommittee and now embodied in the bill passed by the full committee and the Congress will be acted on by the Senate. And I am hopeful that we can see the light at the end of the tunnel on this particular—on a solution to this particular problem. I am very optimistic.

I wouldn't be that optimistic if it were not for what you all have done and, again, I appreciate that very much. Thank you.

Let me call our next panel of witnesses. Mr. Gerald Farquhar, from here in Washington; Mr. Randall Vosbeck, past president of the American Institute of Architects; Richard Karn, president-elect

of the American Society of Civil Engineers; Dr. Edward Pfrang, executive Director of the American Society of Civil Engineers; and Richard Wolfe, with the National Conference of States on Building Codes and Standards.

Gentlemen, if all of you would come to the witness table, please, we'll get started with our panel.

I think a couple of our witnesses may be a little bit late. We got through with our first panel a little bit sooner than is normally the case. We will go ahead. If you three gentlemen will identify yourselves to our reporter, starting with you, Mr. Wolfe.

Mr. WOLFE. Yes, I am Richard Wolfe, director of the Arizona Office of Manufactured Housing and currently president of the National Conference of States on Building Codes and Standards.

Mr. PFRANG. I am Edward Pfrang, executive director of the American Society of Civil Engineers.

Mr. KARN. I'm Richard Karn. I'm president of Bissell & Karn, Inc., consulting engineering firm in San Francisco area, and I am here as president-elect of the American Society of Civil Engineers.

Mr. GORE. Very good. OK, our other witnesses are on the way and Mr. Karn, we will begin with you. Without objection, your prepared statement will be included in the record. Feel free to present it or feel free to summarize any portions of it if you care to do so. Welcome.

STATEMENTS OF R. RANDALL VOSBECK, PAST PRESIDENT, AMERICAN INSTITUTE OF ARCHITECTS; RICHARD W. KARN, PRESIDENT-ELECT, AMERICAN SOCIETY OF CIVIL ENGINEERS, ACCOMPANIED BY DR. EDWARD O. PFRANG, EXECUTIVE DIRECTOR, AMERICAN SOCIETY OF CIVIL ENGINEERS; AND RICHARD E. WOLFE, NATIONAL CONFERENCE OF STATES ON BUILDING CODES AND STANDARDS

Mr. KARN. Thank you, Mr. Chairman, members of the committee. I would like to just summarize my statement and request that the full statement be in the record.

We appreciate this opportunity to discuss public dissemination of data about the causes of structural failures and we commend the chairman and members of the committee for their active interest in this important subject.

The Society—the American Society of Civil Engineers—shares your concern about wide dissemination of information on structural failures. While the failure rate of U.S. structures is only a tiny fraction of a percent each year, the high potential for loss and injury to human life, combined with the important lessons to be learned from failure investigations make it vital that failures not only be investigated, but that findings be widely available.

Unfortunately, dissemination of information concerning structural failures is not as widespread as it should be. Perhaps the major inhibiting factor for wide—to wide dissemination of information is the soaring litigation and the resulting fear of lawsuits. There tends to be a desire to obscure rather than illuminate some of the causes of failure because of the proclivity to tie failure with causation in the duty and negligence—in duty and negligence determination.

Before addressing the possibility of a national clearinghouse of information, we would like to make the subcommittee aware of some of the existing sources of information for the industry, as well as for the public. The American Society of Civil Engineers has a long tradition of disseminating information concerning structural safety and structural failures.

An examination of the Society's magazine, "Civil Engineering," over the last several years, reveals that the structural failures are a continuing theme. We cite that in several instances in the written testimony.

A number of the Society's technical and professional divisions have long been and continue to be deeply involved in activities aimed at reducing the risk of structural failures. It was within the Research Council on Performance of Structures, sponsored by our structural division, as Neal FitzSimons previously told you, that he and others first developed a concept of an engineering performance center which eventually became reality at the University of Maryland as AEPIC.

The American Society of Civil Engineers, as one of the integral forces in AEPIC's creation, wholeheartedly supports AEPIC and its work. AEPIC stresses information of technical merit which does not assign responsibility in an effort to disassociate itself from litigation on failures.

Furthermore, because AEPIC is already performing the functions of a national clearinghouse for failures information, we do not see the need for the Federal Government to fund a similar operation. With the great number of information sources already in place, including AEPIC, we feel that emphasis should be placed on improving current information channels, rather than creating new and redundant information paths.

The Federal Government can assist in the important work of AEPIC by continuing to provide partial support for AEPIC.

Finally, we wish to comment on section 307 in H.R. 5172, the authorization for the National Bureau of Standards for fiscal years 1984 and 1985 which would authorize NBS to conduct structural failures investigations on its own initiative, rather than at the invitation of State and local authorities. Our concern with this change is that while NBS excels at technical investigations, they are neither able nor authorized to examine the professional aspects of structural failures. In other words, NBS is able to investigate the hardware aspects of a failure, but is not able, nor should it attempt to examine the software aspects of failures.

A review of the reports of the more recent structural failure investigations conducted by the National Bureau of Standards reveals that few new technical lessons were uncovered, however the collapses did take place, indicating that their causes were procedural rather than technical, yet the procedural aspects of these failures have not been investigated and reported upon.

If we are to reduce the risk of structural failures, not only must the technical aspects be investigated and reported on, but also the procedural aspects need study and reporting. This can only be accomplished through the involvement of professional organizations such as ASCE.

Second, we are most concerned about the authorization of NBS investigations without invitations from State and local governments. Without such invitations, NBS would not be participating in a cooperative way. Since NBS does not, and probably should not have subpoena power, it can only effectively conduct such investigations when it has the full cooperation of those having such legal authority.

NBS currently has all the necessary authority to undertake investigations when invited by appropriate agencies or State or local governments, thus no new authority is necessary or advisable. For this reason, the society cannot favor section 307 of H.R. 5172.

Thank you, Mr. Chairman, and members of the committee for the opportunity to testify. Dr. Pfrang and I will be glad to participate in answering any questions you may have.

[The prepared statement of Mr. Karn follows:]

TESTIMONY OF

RICHARD W. KARN

PRESIDENT-ELECT

AND

EDWARD O. PFRANG

EXECUTIVE DIRECTOR

AMERICAN SOCIETY OF CIVIL ENGINEERS

REGARDING

PUBLIC DISSEMINATION OF DATA

ON CAUSES OF STRUCTURAL FAILURES

BEFORE THE

SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

OF THE

COMMITTEE ON SCIENCE AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

April 25, 1984

Mr. Chairman and members of the Subcommittee, my name is Richard W. Karn and I am president of the San Francisco Bay area consulting engineering firm of Bissell & Karn. I appear before you today in my capacity as President-elect of the American Society of Civil Engineers (ASCE). Also appearing on behalf of the Society is Dr. Edward O. Pfrang, ASCE's Executive Director.

We appreciate this opportunity to discuss public dissemination of data about the causes of structural failures and commend the Chairman and members of the Subcommittee for their active interest in this important subject. I request that our written statement be included in the record and that I be permitted to make a brief oral summary.

The American Society of Civil Engineers, founded in 1852, is the oldest national engineering society in the United States. Begun as a way to disseminate information among those engaged in the budding discipline of engineering — the road, canal, bridge and railroad builders of the young nation — the Society had just 12 members at the start.

Today, ASCE numbers over 95,000 members, some 10,000 of whom live and work outside the United States in virtually every corner of the world. Membership is held by individual professional engineers rather than companies or organizations and about equally divided among engineers engaged in consulting practice; engineers in positions with federal, state or local government, and those engaged in a variety of related fields such as research, development, construction and education. The Society is organized into 22 technical and professional divisions covering all aspects of civil engineering. It also has a strong grass roots structure consisting of 82 local sections and 132 branches as well as 198 student chapters.

The Society shares your concern about wide dissemination of information on structural failures. While the failure rate of U.S. structures is only a tiny fraction of a percent each year, the high potential for loss and injury to human life combined with the important lessons to be learned from failure investigations, make it vital that failures not only be investigated but that findings be widely available. Unfortunately, dissemination of information concerning structural failures is not as widespread as it should be. Perhaps the major inhibiting factor to wide dissemination of information is soaring litigation and the resulting fear of lawsuits. There tends to be a desire to obscure rather than illuminate the cause of failure because of the proclivity to tie failure with causation in a duty and negligence determination.

Before addressing the possibility of a national clearinghouse of information, we would like to make the Subcommittee aware of some of the existing sources of information for the industry as well as for the public. The American Society of Civil Engineers has a long tradition of disseminating information concerning structural safety and structural failures. Starting in 1872 with the very first publication of ASCE proceedings, there appeared two papers about structural failures, "Accidents to Railway Structures" and "On the Use of Cast Iron for Compression Members of Iron Bridges." Over the course of more than a century, such papers have diffused knowledge and experience among the profession which resulted in new structures that were vastly improved in safety and economy. An examination of the Society's magazine — Civil Engineering — over the last several years reveals that structural failures are a continuing theme. In the May and June issues of 1980, a two-part series titled "Basics in Failure Analysis of Large Structures" provided helpful steps for undertaking a simple or complex failure analysis. In December 1981 and January 1982, another two-part series examined several areas of special concern to structural failures. Two winners of Civil Engineering's 1981 essay contest wrote about structural safety in the June 1982 issue. The July

1982 issue contained a paper based on the National Bureau of Standards investigation of the collapse of the Kansas City Hyatt Regency walkways written by Drs. Pfrang and Marshall. A January 1983 article examined steps for improving inspection procedures for buildings during construction. Survey results reported in the July 1983 issue revealed overwhelming support by ASCE membership for a more active Society role in preventing engineering failures. Finally and most recently, in January 1984, an article described the background and work of the Architecture and Engineering Performance Center (AEPIC) at the University of Maryland. Thus, the Society's journals and magazine have had an important role in keeping this issue before the nation's civil engineers, other design professionals and those engaged in construction.

A number of the Society's technical and professional divisions have long been and continue to be deeply involved in activities aimed at reducing the risk of structural failures. It was within the Research Council on Performance of Structures sponsored by our Structures Division that Neil FitzSimons and others first developed the concept of an Engineering Performance Information Center (EPIC) which eventually became reality at the University of Maryland as AEPIC. In recent years, two committees have been established to specifically address special problems related to structural failures. The first is the Engineering Performance Information Committee which was established to serve as the focal point for the Society's efforts to promote the establishment and proper functioning of a national clearinghouse for information.

The second is the Committee on Forensic Engineering which has been active in dissemination of failure information, development of guidelines for investigations, consideration of means of influencing changes in the design and construction industry to reduce failures and an examination of ASCE's potential role in investigating failures. Under this Committee, the Working Group on Information Dissemination has determined

that the most important contribution it can make to the Society, the profession and the public is to help the profession learn from its failures by wide dissemination of failure information. To avoid duplication of existing efforts, the Working Group first examined the work of a variety of domestic and international organizations and individuals. It found that most disseminate failure information on a specialized or ad hoc basis. Based on these findings and their survey of the Society, the Working Group has recommended several courses of action. First, the Working Group plans to assist AEPIC in material collection and with the establishment of a quarterly journal of failures case histories. The Working Group has also recommended taking advantage of the wide circulation of Civil Engineering (107,954 members and non-members monthly) to help disseminate information. Ideas for Civil Engineering include a pilot project for a bimonthly column on general failure issues as well as a summary article which would review work by others and list available resources for learning from failures. Finally, the Working Group plans to maintain the liaison with the other organizations which was initiated for this study. Such liaison will insure wide dissemination of information, continued cooperation and prevention of duplicative efforts by organizations interested in structural failures.

Taken together, these organizations have collected and disseminated a tremendous amount of information about structural failures. Yet, until recently there was no central repository for these data. The concept of an engineering performance information center was first proposed within the Society in 1964. After many years and a lengthy process probably described in other testimony today, the Architecture and Engineering Performance Infrmation Center (AEPIC) supported by a grant from NSF opened at the University of Maryland in 1982. AEPIC is designed for architects and engineers to efficiently retrieve information on incidents involving structural performance. No doubt AEPIC will describe their current activities to you today in greater detail. The

American Society of Civil Engineers, as one of the integral forces in AEPIC's creation, wholeheartedly supports AEPIC and its work. AEPIC stresses information of technical merit which does not assign responsibility in an effort to disassociate itself from litigation on failures. Furthermore, because AEPIC is already performing the functions of a national clearinghouse for failures information, we do not see the need for the federal government to fund a similar operation. With the great number of information sources already in place including AEPIC, we feel that emphasis should be placed on improving current information channels rather than creating new and redundant information paths. The federal government can assist in the important work of AEPIC by continuing to provide partial support for AEPIC.

Members of the Society, particularly Dr. Pfrang, our executive director, have participated in many failure investigations. The Society has itself performed failure investigations, most notably the Port Sines Investigation which was funded by the National Science Foundation and headed by Dr. Billy L. Edge of Clemson University in South Carolina. The objectives of this investigation were to collect perishable data on and to identify possible causes of the failure which took place on February 2, 1978, of the rubble mound breakwater at Port Sines, on the Atlantic coast of Portugal. The breakwater, situated in a previously untried combination of unusually deep water and a high-energy marine setting, was the largest of its kind in such an exposed environment. The breakwater was to have sheltered within its reach a port for an ambitious industrial coplex on which the economic future of Portugal is in large part predicated. Construction was almost complete when critical damage was sustained. The purpose of the investigation was not to find a crucial error or omission. Rather, it was to report on possible problems, omissions and errors that could have contributed to the failure. On a broader level, the investigation team hoped that engineers would be able to benefit from the experience at Port Sines in the design and construction of future breakwaters.

In 1983, the Port Sines investigating Panel received the Arthut M. Wellington Prize which was instituted and endowed by The Engineering News-Record for papers on land, water or air.

Finally, we wish to comment on Section 307 in H.R. 5172, the authorization for the National Bureau of Standards for fiscal year 1984 and 1985, which would authorize NBS to conduct structural failure investigations on its own initiative rather than at the invitation of state and local authorities. Our concern with this change is that while NBS excels at technical investigations, they are neither able nor authorized to examine the professional aspects of structural failures. In other words, NBS is able to investigate the hardware aspects of a failure but it is not able nor should it attempt to examine the software aspects of failures. A review of the reports of the more recent structural failure investigations conducted by the National Bureau of Standards:

- Investigation of the Skyline Plaza Collapse in Fairfax County, Virginia. March 2, 1973;
- Investigation of Construction Failure of Reinforced Concrete Cooling Tower at Willow Island, West Virginia. April 27, 1978;
- Investigation of Construction Failure of Harbour Cay Condominium in Cocoa Beach, Florida. May 27, 1981;
- Investigation of the Kansas City Hyatt Regency Walkways Collapse. July 17, 1981;
- Investigation of Construction Failure of the Riley Road Interchange Ramp in East Chicago, Indiana. April 15, 1982;

reveals that few new technical lessons were uncovered. However, the collapses did take place indicating that their causes were procedural rather than technical. Yet the procedural aspects of these failures have not been investigated and reported upon. If we are to reduce the risk of structural failures, not only must the technical aspects be investigated and reported on, but also the procedural aspects need study and reporting. This can only be accomplished through the involvement of professional organizations such as ASCE.

Secondly, we are most concerned about the authorization of NBS investigations without invitations from state and local governments. Without such invitations, NBS would not be participating in a cooperative vein. Since NBS does not and probably should not have subpoena power, it can only effectively conduct such investigations when it has the full cooperation of those having such legal authority. NBS currently has all necessary authority to undertake investigations when invited by appropriate agencies of state or local governments, thus no new authority is necessary or advisable. For this reason, the Society cannot favor Section 307 of H.R. 5172.

Thank you very much, Mr. Chairman and Members of the Subcommittee. We will be happy to answer any questions.

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Mr. GORE. Well, thank you very much. I have some comments on your reservations about section 307, but I will hold them until the panel has been completed, because I think Mr. Wolfe also addresses the same subject, and I will call on you now, Mr. Wolfe.

You are here in this capacity representing the National Conference of States on Building Codes and Standards and we welcome you and invite you to proceed with your statement.

Mr. WOLFE. Thank you, Chairman Gore, and members of the subcommittee, for inviting me to testify before you today on behalf of the States on the issue of authorizing the National Bureau of Standards to investigate structural failures in buildings.

The organization which I represent, the National Conference of States on Building Codes and Standards was founded in 1967 to nationally coordinate the building code and public safety interests of our Nation's 50 States and several territories. The voting membership of my organization is comprised of one Governor-appointed delegate from each of the States and the three U.S. territories.

Our delegates at the statewide level have the broadest responsibilities for health and life safety in new and existing buildings. The States share with the Members of Congress the deep concern that efforts must be made in both the public and private sectors to significantly reduce, if not eliminate, structural failures in public buildings.

The conference, therefore, has followed with great interest the hearings on structural failures which this subcommittee held in August 1982. We recently received your final report on those hearings and are in the process of sharing copies of that report with our State delegate members.

The conference agrees with several of the recommendations contained in your final report and at a forthcoming board of directors meeting, we will consider actions which the conference can take in support of implementing some of those recommendations.

The issue of timely, independent investigations and dissemination of information regarding the technical causes of structural failures in buildings has long been an area of particular concern to our members. At a number of our annual meetings, we have heard formal presentations by our State delegates and by the staff of the National Bureau of Standards concerning the extreme difficulty, and in many cases, the impossibility of obtaining reliable data on the technical cause of a structural collapse.

The conference shares your view that the authorization of an independent investigative body housed within the National Bureau of Standards is an appropriate response for the Federal Government to take in this matter. However, we are concerned that such authority not be preemptive in nature.

We believe that as currently written, H.R. 5172 is unclear in this area and therefore could endanger the opportunity for the Federal, State, and local governments to cooperatively take effective action on the problem of building structural failures.

Over the years, the National Bureau of Standards has worked cooperatively with State and local governments in its research and transfer of technical information in the area of building codes and standards. The research facilities and expertise of the Bureau's personnel at the Centers for Building Technology and Fire Research

have become invaluable resources to States in their efforts to adopt, administer and enforce modern building codes and standards.

In carrying out these functions, the Bureau has acquired the technical expertise and research facilities necessary to investigate and report on the technical causes of structural failures. The Bureau also has established a track record of working cooperatively with State and local governments, a record which I believe is unique at the Federal level of Government.

In recognition of these facts, in recent years, the Bureau has been requested by State and local governments to provide teams of experts to investigate and report on the technical causes of building failures. The Bureau's investigation and report on the Kansas City Hyatt Regency walkway's collapse is perhaps the best example of such cooperation.

That report on the Kansas City disaster also has served as a good example of the need for the Federal, State, and local levels of government to establish a mechanism through which the Bureau, when requested, can gain rapid and complete access to the building disaster area.

Unlike airline or railway disasters, building structural failures are clearly within the domain of the State constitutional authority. In discussing this jurisdictional dilemma with senior staff of the National Bureau of Standards, members of our board of directors recently decided to appoint a committee to work with the Bureau to draft a model agreement between the Bureau and State and local jurisdictions to facilitate the Bureau's investigation of building failures and disasters.

This project also has been endorsed by our State delegate members and will be initiated within the next few months. Since each State's administrative and legal responsibility over building codes and public safety differ widely, the proposed model agreement will contain basic language that can be individually tailored by each State to legally provide the Bureau with immediate and complete access to the disaster area.

Once drafted, the conference will recommend that each State consider adopting the agreement either administratively or legislatively. The States thus would have the agreement in place to be invoked should a building disaster occur and the State desires the Bureau's assistance in investigating and determining the cause.

In those States where the State has delegated all responsibility for building codes and public safety to local jurisdictions, such an agreement would have to be negotiated by the Bureau with local units of government. As it is now written, H.R. 5172 is vague concerning the authority of the Bureau to initiate and conduct such investigations.

While it is the position of the Bureau to exercise such investigative responsibility only upon the State's invitation, we believe that the passage of H.R. 5172 would be enhanced if this subcommittee amended the bill to include appropriate language clearly spelling out that process and the fact that the Bureau's authorization in this area was not preemptive of State and local authority.

Thus amended, passed and signed into law, the NBS building failure investigations provisions of the bill would serve this country

well. We strongly believe that the States and the local jurisdictions will avail themselves of this opportunity to receive the qualified investigative services of the Bureau.

This would be a positive step toward significantly reducing the number of structural failures which occur in public facilities in this country.

I thank you for offering me this opportunity to share with you our conference and our State's concerns on this matter and I'll be happy to answer your questions.

[The prepared statement of Mr. Wolfe follows:]

Before the
U.S. House of Representatives
Subcommittee on Investigations and Oversight
of the
Committee on Science and Technology

IN THE MATTER OF: H.R. 5172

Fiscal Year 1984 and 1985 Appropriations)
for the National Bureau of Standards and)
Authorization of the Bureau to Investi-)
gate Structural Failures)

Written Testimony
of the
NATIONAL CONFERENCE OF STATES ON
BUILDING CODES AND STANDARDS, INC.

BY: Richard E. Wolfe, President
National Conference of States
on Building Codes & Standards, Inc.
481 Carlisle Drive
Herndon, Virginia 22070

April 26, 1984

Before the
U.S. House of Representatives
Subcommittee on Investigations and Oversight
of the
Committee on Science and Technology

IN THE MATTER OF: H.R. 5172

Fiscal Year 1984 and 1985 Appropriations)
for the National Bureau of Standards and)
Authorization of the Bureau to)
Investigate Structural Failures)

SUMMARY
Written Testimony
of the
NATIONAL CONFERENCE OF STATES ON
BUILDING CODES AND STANDARDS, INC.

Regarding the proposed authorization contained in H.R. 5172 for the National Bureau of Standards "on its own initiative" to "initiate and conduct investigations of structural failures" the National Conference of States on Building Codes and Standards, Inc. (NCSBCS) finds that:

1) The protection of the public's health and life safety in buildings is a responsibility reserved to the states and their local governments under the police powers of the United States Constitution.

2) Representing the building code and public safety interests of our fifty states and several territories, NCSBCS shares with members of the U.S. Congress the deep concern that significant efforts be made at every level of government to try and eliminate structural failures in public facilities.

3) The Conference further concurs with the findings of this Subcommittee's recent report that all too frequently in the past, when structural failures in buildings have occurred, that potentially life saving information concerning the technical causes of such collapses have been kept secret or otherwise excluded from public dissemination by legal actions.

4) The timely investigation into and dissemination of technical information concerning the causes of such failures by an independent, highly professional, and technically qualified national agency working in cooperation with the states would be in the best interests of the citizens of our nation.

5) That there exists within the National Bureau of Standards the independence, technical expertise, and research facilities to effectively carry out such a function. In recognition of that fact, upon several occasions in the recent past, at the request of the states and local jurisdictions, the National Bureau of Standards has successfully provided such investigative services in an independent, reliable, and timely manner.

Based upon these findings, NCSBCS concludes:

That it is proper for Congress to authorize the creation of such an independent investigative function within the National Bureau of Standards and to empower that body to enter into agreements of cooperation with the fifty states and several territories and, where appropriate, with local jurisdictions to conduct timely investigations and information dissemination covering the causes of structural failures in public facilities.

Before the
U.S. House of Representatives
Subcommittee on Investigations and Oversight
of the
Committee on Science and Technology

IN THE MATTER OF: H.R. 5172

Fiscal Year 1984 and 1985 Appropriations)
for the National Bureau of Standards and)
Authorization of the Bureau to Investi-)
gate Structural Failures)

Written Testimony
of the
NATIONAL CONFERENCE OF STATES ON
BUILDING CODES AND STANDARDS, INC.

The National Conference of States on Building Codes and Standards, Inc. (NCSBCS) is an organization founded in 1967 to nationally coordinate the building code and public safety interests of the nation's fifty states and several territories. The voting membership of the Conference is comprised of one governor-appointed delegate from each of the states and three U.S. territories. These delegates, for the most part, at the statewide level have the broadest responsibilities for health and life safety in new and existing buildings. Reflecting that connection, in 1981 the Conference became an Executive Branch Organization of the National Governors' Association (NGA).

The Conference has followed with great interest the hearings which this Subcommittee held in August 1982, concerning structural failures in public buildings. We recently received the Report by the House Committee on Science and Technology on "Structural Failures in Public Facilities," and we are in the process of sharing copies of that report with our state delegate members.

The states share with the Committee the deep concern that efforts must be made in both the public and private sectors to significantly reduce, if not eliminate, structural failures in public buildings. The Conference agrees with several of the recommendations contained in your recent report and at a forthcoming Board of Directors meeting will be considering actions which NCSBCS can take in support of implementing some of those recommendations.

The issue of timely independent investigations and dissemination of information regarding the technical causes of structural failures in buildings has been an area of particular concern to our members. At each of our annual meetings during the past ten years, our members have raised and discussed this issue. On several occasions we have heard formal presentations by our state delegates and by members of the staff of the National Bureau of Standards concerning the extreme difficulty, and in many cases the impossibility, of obtaining reliable data on the technical cause of a structural collapse of a building or other public structure. Representing the building code and public safety interests of the states, we therefore greatly appreciate this Subcommittee's effort to deal with that issue legislatively.

We believe that the authorization of an independent investigative body housed within the National Bureau of Standards is an appropriate response for the Federal government to take on this matter, provided nothing within the authorization of such a Federal investigative body is written or implied to authorize that agency to preempt the states' and their local jurisdictions' Constitutional rights and responsibilities for the health and life safety of their citizens in buildings. We believe that the current language of H.R.5172 in this area is unclear and, therefore, could endanger an opportunity for the Federal, State, and local governments to cooperatively take effective action on this aspect of the building structural failure problem.

In the remainder of this testimony we would like to address both the appropriateness of the selection of the National Bureau of Standards to serve as an investigative agency and the importance that the Bureau's investigations be conducted under formal agreements of cooperation negotiated and signed by the states, and/or, where appropriate, their local jurisdictions.

Over the years, the National Bureau of Standards has worked cooperatively with state and local government in its research and transfer of technical information in the area of building codes and standards. The research facilities and expertise of the Bureau's personnel at the Centers for Building Technology and

Fire Research have become invaluable resources to the states in their efforts to adopt, administer, and enforce modern building codes and standards. Earlier this year, the Conference provided extensive testimony in this regard before the House Subcommittee on Science, Research, and Technology (February 7) and the Senate Subcommittee on Science, Technology, and Space (March 6).

Since its inception in 1967, the National Conference of States on Building Codes and Standards has worked closely with the National Bureau of Standards. In 1978, a Memorandum of Understanding was signed by NCSBCS and NBS. This Memorandum calls for NBS to provide technical assistance to NCSBCS and conduct research needed by the states in carrying out building regulatory responsibilities. A copy of this Memorandum is enclosed for your information.

The use of NBS' research results by NCSBCS and the states, furthermore, has contributed effectively to the National Bureau of Standards' goal of transferring research results and up-to-date technology to the states, and ultimately for the benefit of the American public.

In carrying out these functions, the Bureau has not only acquired the technical expertise and research facilities necessary to investigate and report on the technical causes of structural failures, it also has established a strong track record of working cooperatively with states and local governments, that perhaps is unique at the Federal level of government.

In recognition of these facts, upon several occasions in recent years the Bureau has been requested by state and local governments to provide teams of experts to investigate and report upon the technical causes of building failures. The Bureau's investigation and report on the Kansas City Hyatt Regency Walkways Collapse is perhaps the best example of such cooperation.

The Bureau's report on the Kansas City disaster, as noted in your Subcommittee's August 1982 hearings, also served as a good example of the need for Federal, state, and local levels

of government to establish a mechanism through which the Bureau, when requested, can gain rapid and complete access to the building disaster site.

Unlike airline or railway disasters, building structural failures (unless they occur in a Federally-owned or leased facility) are clearly within the domain of the state constitutional authority. (Building codes and public safety constitutionally, as a police power, are reserved to the states and their local juridictions.)

In discussing this jurisdictional issue with senior staff of the National Bureau of Standards, members of the NCSBCS Board of Directors recently agreed to appoint a committee to work together with the Bureau to draft a "model agreement between NBS and state and local jurisdictions to facilitate the Bureau's investigation of building failures and disasters." As noted in a recent issue of our Newsletter (page 4, copy attached), this project also has been endorsed by our state delegate members and will be initiated within the next few months.

Since each state's administrative and legal responsibility over building codes and public safety differs widely, the proposed model agreement would contain the basic language that would be necessary to legally provide the Bureau (once it has been formally invited by a state or local jurisdiction to investigate a building collapse) with immediate and complete access to the disaster site. Once drafted, the Conference would recommend to its member state delegates that each state consider adopting the agreement either administratively or legislatively. The states, thus, would have the agreement in place to be invoked should a building disaster occur and the state desire the Bureau's assistance in investigating and determining its cause. (In those states, where the state has delegated all responsibility for building codes and public safety to local jurisdictions, such an agreement would have to be negotiated by the Bureau with local units of government).

As it is now written, H.R.5172 is vague concerning the authority of the Bureau to initiate and conduct investigations of building structural failures. While it is the position of the Bureau to exercise such investigative responsibility only upon the state's invitation, we believe that passage of H.R.5172 would be enhanced if this Subcommittee amended the Bill to include appropriate language clearly spelling out that process and the fact that the Bureau's authorization in this area was not preemptive of state and local authority. (Rather than having to wait until all of the states concluded such agreements, such clarification should also empower the Bureau to undertake "invited" investigations in those state and/or local jurisdictions immediately after the appropriate agreement has been signed).

Thus, amended, the NBS building failure investigations provisions of H.R.5172, if enacted by both Houses of Congress and signed into law, would serve this country well. We strongly believe that the states and their local jurisdictions will avail themselves of this opportunity to receive the qualified investigative services of the Bureau. This would be a positive step towards significantly reducing the number of structural failures which occur in public facilities in this country.

Thank you for affording me this opportunity to share with you the Conference's views on this important matter.

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE NATIONAL CONFERENCE OF STATES ON BUILDING CODES AND STANDARDS, INC.

AND

THE NATIONAL BUREAU OF STANDARDS

I. Introduction

The National Conference of States on Building Codes and Standards (NCSBCS) was formed in 1967 in response to "the need for intergovernmental reforms in the area of building codes," as recommended by the Advisory Commission on Intergovernmental Relations.

From the inception of NCSBCS to October 1976, Secretariat services were provided NCSBCS by the National Bureau of Standards (NBS). These services included administrative and technical support. The authority to furnish this support is contained in sections 2(d) and 3 of the NBS Organic Act (15 U.S.C. 272(d), 273).

Many technical studies and much research have been carried out in the Center for Building Technology (CBT) of the Institute for Applied Technology (IAT) at NBS, as a direct result of stated needs by NCSBCS. Examples of such programs include the Laboratory Evaluation and Accreditation Program, Coordinated Evaluation System, Uniform Regulation of Manufactured Buildings and Mobile Homes, and Energy Use Criteria for Standards. The use of these programs by NCSBCS has effectively contributed to the NBS goal of transferring research results and up-to-date technology to the States and ultimately the building owner and user.

With recent growth and development, NCSBCS has matured to the stage of becoming an incorporated entity with administrative self-sufficiency and independence. When NCSBCS entered into contractual agreements with other Federal Government agencies, it realized, as did NBS, that administrative and logistical support by NBS should be transferred from NBS to NCSBCS, while technical research support should be enhanced so as to further the goals of both organizations.

II. Purpose

The purposes of this agreement are to: (1) set forth a commitment of continued mutual support between NBS and NCSBCS; (2) establish a procedure for appropriate joint program planning and continued technical cooperation between the two organizations; (3) outline the general conditions under which NBS and NCSBCS cooperative efforts will be formulated and conducted; and, (4) set forth those technical and other services to be provided either organization by the other.

Through this cooperative effort, both organizations can work together toward the common goal of improving the building regulatory system through the application of research and technology. This work will contribute to the public welfare by providing a safer, more healthful built environment at less cost.

III. Statement of Intent

The past relationship between NBS and NCSBCS proved to be beneficial to both organizations in developing and applying building technology to the special problems encountered in building regulation. It is, therefore, agreed by both organizations that close cooperation and contact will be

maintained in the future so as to bring the resources of both organizations to bear on national problems related to (1) deficient and needed new standards and codes for building regulations, and (2) inadequate processes for regulating building design and construction.

1. NBS will carry out technical and research activities for NCSBCS in the following areas:

   a. NBS agrees to provide technical advice and consultation to NCSBCS—its Board of Directors, Committees and individual States, when requested, in areas in which NBS possesses scientific and technological expertise, within the limits of funds and manpower available and consistent with existing policy regarding such services. Requests for such services will be made in writing.

   b. NBS agrees to provide NCSBCS with the latest NBS technical reports, publications and other results of current NBS building research related to building regulatory concerns.

   c. NBS agrees to undertake research for NCSBCS on building regulatory concerns of national interest, when appropriate and subject to existing resources and programmatic limitations. Such research will be conducted on a cost reimbursable basis, when appropriate, under authority of section 7 of the NBS Organic Act (15 U.S.C. 275a) and in accordance with NBS Project Acceptance Criteria. Any such cost reimbursable research will be undertaken by NBS upon execution of a written research agreement between the two organizations.

d. NBS agrees to duly consider the regulatory research needs of the States as expressed by NCSBCS in planning the NBS building research program.

e. NBS agrees to furnish technical expertise to the NCSBCS Standing Committees. NBS agrees to furnish an appropriate technical staff person to participate in the activities of each of NCSBCS's four Standing Committees: (1) Education and Qualification, (2) Codes Administration, (3) Reciprocity, and (4) Standards and Evaluation, and others as mutually agreed upon. This technical support will be provided by NBS to NCSBCS at no cost to the latter organization. These staff persons will be Associate Members of the respective committees and will be selected by the Chief of the Office of Building Standards and Codes Services, Center for Building Technology. Committee participation shall be in accordance with Article VIII, Section 1 and Section 2, of the NCSBCS Bylaws dated September 23, 1976.

2. NCSBCS will carry out studies for NBS and implementation activities based upon NBS research results in the following areas:

a. NCSBCS agrees to undertake surveys, data gathering and other studies related to the building regulatory system for NBS, as requested by NBS, when appropriate and subject to existing funds and manpower limitations. Such activities will be conducted on a cost reimbursable basis through an appropriate contract with NBS.

b. NCSBCS agrees to annually prepare and submit to NBS a written list of high priority research needed to address building regulatory and related problems.

c. NCSBCS agrees to share with NBS nonconfidential progress and other programmatic reports relating to building technology, standards and regulations.

d. NCSBCS agrees to implement NBS building research results when and where appropriate and within limits of resources.

IV. Mode of Operation

In order to facilitate the intent of this agreement, the mode of operation will be as follows:

1. NBS and NCSBCS agree that all cooperative activities shall be funneled through a principal point of contact within each organization. These points of contact are to be the Chief of the Office of Building Standards and Codes Services, Center for Building Technology, Institute for Applied Technology, NBS, and the Executive Director of NCSBCS. To facilitate cooperative activities, the Chief of the Office of Building Standards and Codes Services shall also serve as a Technical Advisor to the NCSBCS Board of Directors.

2. Any information resulting from NCSBCS-supported research at NBS of benefit to the general public will be provided to NCSBCS for either release or approval for NBS to release. Any release of such material by NCSBCS will indicate the source of the research and any release approved for issuance by NBS will acknowledge the support

of NCSBCS. NBS will retain the privilege of individual scientists publishing findings resulting from NCSBCS supported research in professional journals and archival literature.

3. Any information resulting from NBS-supported research by NCSBCS of benefit to the general public will be provided to NBS for either release or approval for NCSBCS to release. Any release of such material by NBS will indicate the source of the research and any release approved for issuance by NCSBCS will acknowledge the support of NBS.

V. Termination

NCSBCS and NBS agree that this Memorandum of Understanding may be terminated by either party 60 days after notifying the other party in writing.

Acting Director
National Bureau of Standards

JAN 03 1978

President
National Conferance of States on
Building Codes and Standards, Inc.

January 27, 1978

National Conference of States on Building Codes and Standards, Inc.
481 Carlisle Drive
Herndon, Virginia 22070

Volume VIII, Issue 2 March / April 1984

CPSC CHAIRMAN, NANCY HARVEY STEORTS (second from right) was briefed by the members of the NCSBCS Board of Directors on their states' current building code and public safety concerns. Ms. Steorts was the Board's chief guest at a dinner they hosted during their March 7–8 meetings in Washington, DC.

Among the topics discussed with Chairman Steorts were health and life safety for elderly Americans, woodstove and kerosene heater safety, ambient air quality standards, formaldehyde in building products, and architectural glazing standards.

Other guests present included officials from the National Bureau of Standards (NBS), the Department of Housing and Urban Development (HUD), and the Manufactured Housing Institute (MHI). At the close of the dinner, CPSC Chairman Steorts was presented with a copy of the 1984 National Building Safety Week poster in recognition of the Commission's continued assistance to that public awareness program.

SHIRLEY WISEMAN, General Deputy Assistant Secretary for Housing at the U.S. Department of Housing and Urban Development (HUD), at the head of the table, and members of her staff met on March 8 with members of the NCSBCS Board of Directors to discuss closer cooperation between HUD and the states in the area of affordable housing.

HUD ADOPTS ANSI A225.1 ON MOBILE HOME INSTALLATIONS

On December 1, 1983, W. Calvert Brand, Acting Assistant Secretary for Housing-Federal Housing Commissioner, of the U.S. Department of Housing and Urban Development (HUD), announced that HUD had canceled the Minimum Design Standards for Mobile Home Parks (HUD Handbook 4940.5). HUD adopted ANSI A225.1 which was developed by NCSBCS and the National Fire Protection Association (NFPA).

ANSI A225.1 provides a comprehensive industry-wide standard and parallels HUD's prior standard. It will serve as the minimum criteria for manufactured home sites, communities, and set-ups developed under HUD's Section 207M, Mobile Home Park Program.

To order a copy of the new standard, send a check or purchase order for $8.00 to: information director, NCSBCS, 481 Carlisle Drive, Herndon, VA 22070.

SENATE PASSES SAFETY WEEK RESOLUTION

The U.S. Senate, on March 8, 1984, passed Senate Joint Resolution 70 (S.J. Res. 70). This action designated the week of April 8–14, 1984, as National Building Safety Week. The text of the resolution follows.

JOINT RESOLUTION

To designate the week beginning April 8, 1984, as "National Building Safety Week."

Whereas the health and safety of the people of the Nation are a vital concern of the Federal Government;

(Continued on Page 5)

PRESIDENT'S COLUMN

By Richard E. Wolfe

In early March, I had the opportunity to speak on our nation's voluntary standards process before attendees at the U.S. Consumer Product Safety Commission's (CPSC) National Conference on Product Safety. I would like to share with you some of the remarks I made at that meeting and some additional thoughts on the important role the National Bureau of Standards (NBS) plays in our national standards process.

"Voluntary Standards: How Well Do They Work?"

The basis of the health and life safety provisions which state and local building departments enforce are modern model building codes. These codes, which have evolved over the years to incorporate sound modern building practices and construction techniques, in turn rely heavily upon the referencing of hundreds of voluntary building product and construction standards. The 1984 edition of the "BOCA Basic/National Building Code," for example, references over 250 such standards, while the 1982 edition of the "Uniform Building Code," which is used by the localities throughout my State of Arizona, has 11 pages of referenced voluntary standards.

These standards, developed and maintained by organizations ranging from the Aluminum Association to Underwriters Laboratories, thus, are an essential part of the building safety system in our nation. The degree of safety that the American public, today, enjoys in the buildings in which we all live, work, and play is, to a large extent, possible because we have a voluntary standards program which works.

Consider if you will, for a moment, what the cost of construction and the degree of safety would be in our nation today had not the voluntary consensus process devised procedures with which to evaluate and standardize such basics as: grades of steel and lumber, the heat content of various fuels, or even the dimensions of pipe threads.

State and local governments which are charged with the responsibility of adopting and enforcing building safety codes, could not do so without the presence of a viable voluntary standards system. No state or local jurisdiction could afford to hire the technical staff, conduct the testing and research, or maintain the properly balanced committees necessary to generate and maintain the hundreds of product standards which underlie their building codes. Consider what both construction costs and national uniformity would be like were it possible for the nation's 50 states, 3,000 counties, and tens of thousands of cities and municipalities to generate and maintain such standards.

For these reasons of cost and uniformity, it is significant that the federal government itself, in 1982, issued the Office of Management and Budget (OMB) Circular, A-119, "Federal Participation in the Development and Use of Voluntary Standards." As part of NCSBCS' longstanding support for greater uniformity in the building regulatory process, and voluntary consensus-based standards, the Conference encouraged the federal government's adoption of OMB Circular A-119.

We know that the voluntary standards system works, but how well does it work? What are its major weaknesses? Can it be improved?

Representing the building code and public safety interests of our fifty states and several territories, NCSBCS participates on a number of national voluntary standards committees. The Conference together with the National Fire Protection Association (NFPA), also has written and maintains a voluntary consensus standard regarding manufactured home installations (see article on page 1). Thus, as participants in and users of the voluntary standards process, we see both much that is good and much that needs improvement in our nation's voluntary standards system. What are the areas where improvements are needed?

In April of last year, the U.S. Federal Trade Commission's (FTC) staff produced a 400-page report summarizing their research into abuses which, on occasion, have been made of the voluntary standards system. Perhaps the most significant abuse which has been cited was the misuse of the standards process to block the entry of competitive products into the marketplace.

This weakness has been an outgrowth of the voluntary nature of our standards system. Since funding for standards development is primarily provided by those companies, associations, and individuals with the greatest interest in a particular standard, it is only natural that this is one area in which such an abuse can occur.

The Conference believes strongly that these potential abuses can be avoided by using a consensus process which brings together technically qualified individuals on balanced committees representing the interested and affected parties for a particular product or construction technique.

PRESIDENT RICHARD WOLFE offered NCSBCS's view of the status of the nation's voluntary standards system to attendees at the CPSC National Conference on Product Safety on March 5.

SENATE TESTIMONY. President Wolfe (left) accompanied by NCSBCS Executive Director, Robert Wible, testified on the states' behalf before Senator Slade Gorton's Subcommittee on Science, Technology, and Space on the need for continued funding in FY '85 for the NBS Centers for Building Technology and Fire Research.

In early 1978, the Conference, acting through its delegate members, completed a detailed study of the "Use of National Consensus Standards and Model Building Codes in the Building Regulatory Process." As a result of their study, NCSBCS established a policy to support: "the promulgation of national voluntary consensus standards and model codes developed by procedures that provide adequate due process safeguards for all interest groups and represent a general consensus of technically qualified representatives of all who are affected by the standard or model code."

To carry out this policy, NCSBCS put into place in its own consensus-standards generating process, "Criteria for Standards Acceptability," which we believe should be made applicable to any standard offered for regulatory use. Key elements of that process provide that:

a) The membership of the standard-writing committee at the time of the promulgation of the standard shall be sufficiently balanced so as to allow for the effective representation of all interested persons.
b) The procedures of the standard-writing organization shall allow interested persons to:
   (i) obtain a reconsideration of any action taken by the organization relating to the promulgation of such standards, and
   (ii) obtain a review of the standard (including a review of the basis or adequacy of the standard).
c) It must be supported by *evidence of consensus* and procedural due process as determined by a qualified outside organization or agency, and
d) It must be performance-oriented to the extent practical.

Furthermore, recognizing that "evidence of consensus" is difficult to obtain, the Conference has adopted its own procedures for developing such evidence which we used in the development of our Standard A225.1 for installation of manufactured homes. In brief, those procedures insist that, among other requirements, "all interests substantially concerned with the scope or effect of a proposed standard" be given an opportunity to participate. To assure that, the Conference established a special fund for reimbursement of the costs of consumers to participate on the standards-writing committee.

Finally, the Conference procedures also include substantial record-keeping requirements.

The Conference has worked to improve our national voluntary standards process by encouraging trade associations, manufacturers, federal and state governments, and others to adopt similar procedures. There is, however, another key element to be considered in strengthening our standards system: the continued availability of reliable independent building technology and fire safety test data based upon unbiased research. Over the years, the National Bureau of Standards' (NBS) Centers for Building Technology (CBT) and Fire Research (CFR) have been the largest single source of such research.

NBS Testimony

In late January, the Conference learned that, as in FY 1984, the FY 1985 budget proposal would terminate funding for these NBS Centers. As we understood it, the rationale offered was that research performed by these two Centers should be conducted by state and local governments and the private sector. In testimony before both the House and Senate, the Conference expressed its grave concern over this matter.

In preparation for my March 6th testimony before the Senate Subcommittee on Science, Technology, and Space, I requested NCSBCS staff, in early February, to develop and mail a questionnaire to all our state delegate members to ascertain past, present, and

(Continued on Page 4)

NCSBCS DELEGATES attending regional delegate meetings in Baltimore, Maryland (March 9-10), pictured above, and in Salt Lake City, Utah (March 23 – 24), pictured below, were briefed on the current status of the NBS building technology and fire safety research programs by NBS' Deputy Director for the Center for Building Technology, James G. Gross. Among other items discussed with Mr. Gross was the agreement between NBS and the Conference to cosponsor a joint conference on research and innovation in the building regulatory process during NCSBCS' 17th Annual Conference in Denver, Colorado on September 11, 1984. A copy of a "call-for-papers" flier for the joint conference is enclosed with this newsletter.

future research projects in the building technology and fire safety areas. Thirty of our fifty states responded to that survey. Twenty-nine of the thirty states noted that they are not conducting research in the building technology and fire safety areas, and that their state budgets are too small to even begin contemplating it. They indicated that such research clearly belonged at the federal level.

When describing their current research needs in the building technology and fire safety areas, thirty responding states repeatedly identified those research areas in which NBS is currently engaged: structural failures, computerization of codes, indoor air quality, toxicity, flammability of building materials, smoke control, and residential sprinklers.

When asked if their states could independently fund such research in the future if there were not a Center for Building Technology or a Center for Fire Research, all thirty states answered no.

Our survey results clearly showed that the centralization of such research at the federal level is clearly in the national interest, and well within the scope of President Reagan's "New Federalism." Were it otherwise, we would have chaotic and unproductive research and voluntary standards systems in which each state that could find resources for such testing, research, and standards writing would probably duplicate research and resultant standards work being done in another state or states. This would clearly waste both taxpayers' and consumers' dollars.

As a result of hearings before both the House and Senate, it is our understanding that Congress probably will restore FY '85 funding of both CBT and CFR. The Conference wishes to repeat its support for such funding. We firmly believe that both a strong, voluntary, consensus-based standards-generating process and a reliable, objective, national research facility for building technology and fire safety are vital to the health and life safety of the citizens of all our states and territories.

ANSI PUBLISHES 1984 STANDARDS CATALOG

In February, the American National Standards Institute (ANSI) issued its *1984 Catalog of American National Standards*. According to the ANSI newsletter of February 17, 1984, the volume lists 8,000 ANSI-approved standards related to "dimensions, ratings, terminology and symbols, test methods, and performance and safety requirements for materials, equipment, components," and the gamut of products.

There are standards for the construction; electrical; heating, air-conditioning, and refrigeration; mechanical; measurement; and safety and health fields.

To order copies, send $10.00 to the Sales Department, American National Standards Institute, 1430 Broadway, New York, New York 10018.

NCSBCS PROPOSES CHANGES TO THE MODEL ENERGY CODE

The Energy Programs Division recently proposed changes to the Model Energy Code. These changes would revise the code to comply with the technical criteria in the addenda to ASHRAE Standard 90A-1980. Proposed changes would also update the minimum efficiency criteria to the January 1, 1984 levels in ASHRAE Standard 90A-1980.

These changes will be discussed at open hearings on May 15 in El Segundo, California. Further details are available from the NCSBCS Energy Programs Division, (703) 437-0100.

NCSBCS TRAINS INSTRUCTORS ON MINNESOTA ENERGY CODE

The NCSBCS Energy Programs Division recently finished developing an instructor's manual and workbook on the Minnesota Energy Code. In addition, staff conducted an intensive two-day train-the-trainer workshop for future instructors.

The 210-page manual addresses administrative and technical aspects of the code and is designed to be used with the Minnesota Energy Code and to assist building department staff in enforcing the code.

To efficiently disseminate code information statewide, NCSBCS conducted a training program to foster in-state training capabilities. The instructors who were trained will then present the workshop to local building department personnel throughout Minnesota.

DELEGATES REVIEW PROGRAMS – INITIATE PROJECT TO DRAFT MODEL DISASTER INVESTIGATION AGREEMENT WITH NBS

Delegates from twenty-four states braved late winter storms in Baltimore, Maryland and Salt Lake City, Utah to attend one-and-a-half-day NCSBCS Regional Delegate Meetings. Held in March, the two meetings brought delegates together for an update on NCSBCS committee activities and program and contract efforts.

A highlight of both meetings was uniform support for the Conference cooperating with officials at the National Bureau of Standards (NBS) to draft a model agreement between NBS and state and local jurisdictions to facilitate the Bureau's investigation of building failures and disasters.

Specific recommendations grew out of the regional meetings. Those from Baltimore's March 9-10 Northeast/Southern Regional Meeting were:

- during the annual meeting, to merge standing committee meetings into the same session; and
- to strengthen the use of regional directors in the Conference.

Delegates at the Salt Lake City March 22-23 Midwestern/Western Regional Meeting recommended that the Conference:

- undertake a detailed national survey of existing public and private building technology and fire safety research facilities; and
- develop a national catalog of available education and training materials for state and local building code enforcement personnel.

Delegates attending the meetings endorsed the Conference's continuation of such sessions in 1985. Action item lists from both meetings have been mailed to all NCSBCS delegate members.

NCSBCS TESTIFIES ON ENERGY STANDARDS FOR NEW RESIDENTIAL BUILDINGS

On March 22, 1984, David R. Conover, director of the Energy Programs Division, offered technical testimony on federal energy standards for new residential buildings.

Speaking before the U.S. House of Representatives Subcommittee on Banking, Finance and Urban Affairs, Mr. Conover said it was almost impossible to meaningfully evaluate and compare the technical criteria in "voluntary standards and state energy codes with parallel building regulations such as those of the U.S. Department of Housing and Urban Development (HUD) and Farmers Home Administration (FmHA)."

According to Mr. Conover, HUD and FmHA regulations for dwellings only address building envelope criteria. Thus, they cannot be compared with the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) standard or state energy codes without assuming certain things. Too, accurate comparisons cannot be made between energy use in a residence designed to the ASHRAE standard with one meeting federal regulations.

Because of these difficulties, Mr. Conover, speaking for NCSBCS, recommended that "federal agencies become more involved in the voluntary standards process. This will afford the voluntary sector additional technical input, and through federal agency use of voluntary standards, aid in applying uniform standards to all residential construction."

SAFETY WEEK

(Continued from Page 1)

Whereas since the founding of the Nation, it has been the responsibility of State and local governments to enact and enforce laws and ordinances whenever necessary to protect the health and safety of their residents in the buildings in which they live, work, and worship;

Whereas for purposes of ensuring such health and safety, many State and local governments have adopted and enforce current model building codes and standards that have been developed and maintained with the assistance of interested and affected parties;

Whereas it is through the untiring efforts of the State and local building code enforcement personnel of the Nation, with the support of their elected officials, that the effective administration of these important health and life safety regulations is ensured; and

Whereas it is necessary that the people of the Nation have an opportunity to become aware of the vital health and safety services provided by such enforcement personnel: Now, therefore, be it

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, that the week beginning April 8, 1984, hereby is designated "National Building Safety Week," and the President of the United States is authorized and requested to issue a proclamation calling upon the people of the United States to observe such week with appropriate ceremonies and activities.

CONFERENCE PARTICIPATES IN NGA MIDWINTER MEETING. NCSBCS First Vice-President, William Connolly and Executive Director, Robert C. Wible attended the National Governors' Association's Annual Midwinter Meeting in Washington, DC, February 26–28, 1984. As an Executive Branch Organization of NGA, the Conference regularly provides technical input to several NGA standing committees. During the NGA meeting, the governors passed a resolution paralleling the Conference's position on the U.S. Department of Energy's "no standard standard" for energy efficiency for selected domestic appliances. For more information, contact NCSBCS energy programs director, David Conover at (703) 437-0100.

READERS' HELP NEEDED TO IMPROVE *NCSBCS NEWS*

In a continuing effort to improve NCSBCS' services to the states and their people, staff has included a *Readership Survey* with this issue of the newsletter. The purpose of the survey is to find out readers' likes and dislikes regarding *NCSBCS News* and to garner suggestions for improvement in content, format, and readability.

Please take a minute to complete the enclosed *Survey* and return it by May 21, 1984, to Marjory Crane, information director, NCSBCS, 481 Carlisle Drive, Herndon, Virginia 22070. Your candid feedback will greatly aid us in meeting your information needs.

HOME MANUFACTURERS COUNCIL JOINS NAHB AS FULL MEMBER

According to the *Manufactured Housing Newsletter* of March 2, 1984, the Home Manufacturers Council (HMC) became a full member of the National Association of Home Builders (NAHB) at that organization's annual meeting in Houston.

As HMC joins NAHB, it brings with it councils of its own on panelized, log, modular, and dome home producers as well as a council of associate members.

The newly elected head of HMC/NAHB is Doug Scholz of Unibuilt Industries, a modular producer in Vandalia, Ohio.

MEETINGS SCHEDULE

The *1984 Manufactured Housing Analyst/Investor Conference* will be held on April 24 at The Plaza Hotel in New York City. The chief speaker at the noon luncheon will be Michael Sumichrast, chief economist and senior staff vice-president of the National Association of Home Builders (NAHB). Other speakers will include: Boyd R. Plowman, senior vice-president, finance, Fleetwood Enterprises, Inc.; Isaac Heimbinder, senior vice-president, finance, and secretary, U.S. Home Corporation; and Nicholas J. St. George, president, CEO, Oakwood Homes Corporation. To register contact: The Manufactured Housing Investor Letter and Meetings + Plus, P.O. Box 1981, Palm Springs, California 92263, (619) 323-5462. To reserve hotel rooms, call The Plaza Hotel at (212) 759-3000.

The *Canadian Building Officials Association* and the *Saskatchewan Building Officials Association* will cohost the *International Building Officials Conference* June 3–8, 1984, at the Bessborough Hotel in Saskatoon, Saskatchewan, Canada. With a theme of "Codes, Standards and the Law," the conference will focus on forming an international building officials organization. For details about the meeting, write Everett Dunham, president, Saskatchewan Building Officials Association, P.O. Box 8399, Saskatoon, Saskatchewan, Canada S7K6C7.

The *Association of Physical Plant Administrators of Universities and Colleges* (APPA) will hold its *71st Annual Meeting* June 17–20, 1984, at The Ohio Center in Columbus, Ohio. The meeting theme is "Challenges of Professionalism," and speakers will discuss energy, asbestos, computerization, and hazardous material. For more information, contact Wayne Leroy, assistant executive director, APPA, 11 Dupont Circle, Suite 250, Washington, DC 20036, (202) 234-1662.

The *Construction Specifications Institute* will hold its *28th Annual Convention and Exhibit* in Dallas, Texas, June 16–18, 1984. More than 400 building product manufacturers and service firms will promote their wares at the largest such exhibit in the country. Request additional information from E. M. Dutchak, The Construction Specifications Institute, 601 Madison Street, Alexandria, Virginia 22314, (703) 684-0300.

The *69th Annual Conference* of *Building Officials and Code Administrators* (BOCA) is scheduled for June 26–July 1, 1984, at The Hershey Philadelphia in Philadelphia, Pennsylvania. For more information, call BOCA at (312) 799-2300.

Between September 16 and 21, 1984, the *International Conference of Building Officials* (ICBO) will present its *62nd Annual Conference* at the Hotel Utah in Salt Lake City. For further information call ICBO at (800) 423-6587.

SAFETY WEEK ARTICLES REQUESTED FOR NEWSLETTER

NCSBCS staff plans to report on National Building Safety Week programs throughout the country in the May/June issue of the newsletter. To make sure your state's or locality's activities are included in this story, please submit your Safety Week articles and photographs by May 18, 1984.

Send this material to: Marjory Crane, information director, NCSBCS, 481 Carlisle Drive, Herndon, Virginia 22070.

HOUSING SPENDING, CONTRACTS, STARTS UP; RECENT SALES DOWN

The U.S. Commerce Department and several private organizations report that most housing indicators are rising. The National Association of Home Builders' (NAHB) new Composite Index of Leading Housing Indicators rose 3 percent in January. NAHB believes this indicates the housing recovery will continue through the spring and summer.

NAHB's index comprises seven variables: rate of building permit issuance, mortgage yields, composite lumber prices, construction material prices, Confidence Index of Home Buying (prepared by the Conference Board, a New York organization), builder expectations of future home sales, and builder reports on numbers of potential buyers.

During February, this index rose to 83.4 (on a scale of 100). It was up from 80.89 in January and was twice as high as it was in December 1981. Interest rates remained steady while the issuance of building permits rose to the highest level in six years. The seasonally adjusted annual rate was 1,941,000, up 7 percent from January. Housing starts rose to a seasonally adjusted annual rate of nearly 2.2 million in February. This was the highest rate since April 1978.

According to the *Housing Affairs Letter* of March 9, 1984, the Census Bureau found that in January, the new home sales rate declined 8 percent from December. Nationwide sales in January reached 53,000 units. This figure is 16 percent above the January 1983 rate. January's seasonally adjusted rate of 688,000 is the second best rate since the housing recovery.

The March 2, 1984 issue of *Housing Affairs Letter* reported residential construction grew 3 percent in January to a seasonally adjusted annual rate of $123 billion. Construction of one-family homes led the way. It was up 4 percent to $67 billion. This rate is 47 percent ahead of that in January 1983. Multifamily housing remained stable in January but was 54 percent ahead of where it was the previous year.

According to the F.W. Dodge Division of McGraw-Hill Information Systems Co., in February, construction contracting increased to $14.2 billion from $13.8 billion in January. The advance came in home building and public works projects. The February figure a year ago was $11.35 billion.

Finally, *The Building Official and Code Administrator* of January/February 1984, noted the construction industry posted a 23 percent increase in contracting for 1983. Housing construction increased by 60 percent and achieved a record $192.8 billion in new starts.

AIA NAMES NOTTER PRESIDENT AND MARINES EXECUTIVE VICE PRESIDENT

George M. Notter, Jr. (above), an architect and preservationist, was named as president of the 45,000-member American Institute of Architects (AIA) in December. He is one of the founders and is now the president and director of design with Anderson Notter Finegold Inc., with offices in Boston and Washington, DC.

In another change, Louis L. Marines (above) has taken over the position of executive vice-president from David O. Meeker who resigned in December 1983. Mr. Marines, who will assume his new post in April, is general manager of New York-based A-E Haines Lundberg Waehler.

TRAINING OPPORTUNITIES

This spring the *New Jersey Department of Community Affairs, Bureau of Construction Code Enforcement* is offering a series of training seminars for code enforcement professionals. Programs on the fire protection, plumbing, building, and electrical subcodes will be presented.

The seminars, which began in late March, are being held at Trenton State College in Trenton, New Jersey. Those interested can register by phone or on a first-come basis. Continuing education units (CEUs) will be awarded for each seminar.

For more information on this training opportunity, write: Michelle M. Herbster, Supervisor of Training, Bureau of Construction Code Enforcement, New Jersey Department of Community Affairs, 3131 Princeton Pike, CN 805, Trenton, New Jersey 08625.

Another training and testing opportunity was recently announced by the *Wood Heating Education and Research Foundation* (WHERF). In its program, entitled "Solid Fuel Safety Technician (Program)," WHERF will provide a comprehensive study manual on all aspects of solid fuel appliance installation and maintenance including the most recent changes in NFPA 211. The program is aimed at installers, retailers, salespeople, chimney sweeps, insurance inspectors, and fire and building officials.

After studying the manual, technicians should be well prepared to pass the two-hour test to be conducted by the Educational Testing Service in thirty cities throughout the country. The deadline for registering for the July 31, 1984 test will be June 26, 1984.

Those who pass the test will receive wallet cards indicating they are solid fuel safety technicians. Their names will also be included in a directory to be published later this year.

For more details on this program, write or call: Judy Walker, Wood Heating Alliance, 1101 Connecticut Avenue, Suite 700, Washington, DC 20036, (202) 857-1181.

Finally, *Building Officials and Code Administrators International* (BOCA) has begun its 1984 Professional Development Series. Existing training programs have been changed significantly to reflect the 1984 Basic/National Building Code Update, and 1984 Basic/National Mechanical Code.

Further information is available from: BOCA International, Training and Education Services Department, 4051 West Flossmoor Road, Country Club Hills, Illinois 60477, (312) 799-2300, extension 211.

ANALYSTS PREDICT RISING SALES AND PROFITS FOR MOBILE HOME MANUFACTURERS

Both *USA Today* (March 2, 1984) and *Manufactured Housing* (January 1984) predict strong growth for factory-built housing.

According to *Manufactured Housing*, Predicasts, Inc. of Cleveland, projects that factory-built homes will make up 37 percent of all housing starts in 1995. In 1982, they constituted 28 percent of all starts.

These data come from the study, *U.S. Markets for Manufactured Housing* by Predicasts' senior market analyst, William Harden. He believes that mobile home shipments, which now account for about 50 percent of all new single-family dwellings costing less than $50,000, will increase nearly 6 percent a year. By 1995, Harden says, shipments will reach 500,000 units annually or 33 percent of total single-family starts.

This growth is projected on the assumption that the average prices of stick-built homes will continue to rise. These same forces will also spur a 7 percent annual increase in modular/sectional housing shipments. By 1995, shipments of 120,000 such homes are anticipated. Harden also thinks the distinction between mobile and modular homes will disappear by this time. Copies of this provocative study may be purchased from Predicasts, Inc.

HOUSING OUTLOOK FOR 1984

Several research organizations currently predict increased construction contracting in 1984. According to *Automation in Housing & Manufactured Home Dealer* for February 1984, Wharton Econometric Forecasting Associates predicts 1.86 million housing starts in 1984 and 1.94 million in 1985. The National Association of Business Economists expects 1984 housing starts to reach 1.7 million; Lawyers Title Insurance Corporation anticipates 1.73 million 1984 starts; and the National Association of Home Builders (NAHB) predicts 1.65 million starts.

Another organization which follows housing trends, McGraw-Hill Information Systems Company, expects construction contracting to rise 9 percent from 1983 to reach $210.9 billion. This is $6.3 billion higher than predicted six months ago. The chief threat to such a good year is general concern over the federal budget deficit and fears that it will push interest rates up and choke off expansion.

McGraw-Hill projects that:

- commercial and industrial building (except office building) will enter the strongest phase of its cycle;
- housing demand will equal or top 1983 levels resulting in up to 1.8 million new homes; and
- institutional building will keep on offering steady support to the construction market.

In short, McGraw-Hill expects an 8 percent increase in nonresidential construction contracting. It will rise to $66.6 billion from $61.9 billion in 1983. A 13 percent gain will bring housing contracting up to $105.2 billion.

DENVER WILL BE THE SITE of the 17th Annual Conference of the National Conference of States on Building Codes and Standards, Inc. Scheduled for September 9-13, 1984, at the Denver Marriott Hotel City Center, the conference promises to be most enjoyable. Denver is the home of terrific Mexican and other cuisines and is surrounded by awe-inspiring natural beauty. For further information, write or call Sandy Townsend, executive secretary, NCSBCS, 481 Carlisle Drive, Herndon, Virginia 22070, (703) 437-0100.

MOBILE HOME STANDARDS BRING FIRE-RELATED DEATHS DOWN

Manufactured homes are now safer from fires than site-built homes. The February 1984 issue of *Professional Builder* summarizes a new study by Howard Gates (for the Manufactured Housing Institute) which found the fire death rate in mobile homes built since 1976, 4.3 per 100,000. The Federal Emergency Management Agency (FEMA) says the fire rate for site-built homes is about 6.39 fire deaths per 100,000.

In 1976, HUD began implementing the National Manufactured Home Construction and Safety Standards. According to the study, *Fire Risk in Manufactured Homes – An Update*, mobile homes built since then have fire death rates 25 percent lower than do such homes built before 1976. Too, fire death rates are decreasing at about 5.3 percent per year as of 1981.

When manufactured homes have the required smoke detectors they are safer than site-built homes without them and about equal to site-built homes with smoke detectors.

ASHRAE ANNOUNCES PUBLIC REVIEW OF STANDARD 90 ADDENDA

At its recent midwinter meeting, the ASHRAE Standards Committee approved an addenda to ASHRAE Standard 90A–1980, "Energy Conservation in New Building Design," for public review and comment. The addenda contain over fifty proposed revisions to ASHRAE Standard 90, the most notable of which are revised thermal envelope criteria for low-rise residential buildings.

Since the technical content of this standard forms a basis for many state energy codes, states should be particularly interested in the addenda. Request further information on the addenda and the ASHRAE review process from the Energy Programs Division, (703) 437-0100.

NCSBCS News is published bimonthly by the National Conference of States on Building Codes & Standards, 481 Carlisle Drive, Herndon, Virginia 22070. The *NCSBCS News* is available free to NCSBCS members and to others at an annual subscription rate of $25.

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Mr. GORE. Thank you very much. We will hold up on our questions until we hear from the final witness on this panel, Mr. Randall Vosbeck, past president of the American Institute of Architects. We are delighted to have you here. We appreciate your presence. Please proceed.

Mr. VOSBECK. Thank you. I apologize for being late this morning, Mr. Chairman.

Mr. GORE. That's all right.

Mr. VOSBECK. I am Randy Vosbeck, and I was president of the American Institute of Architects a couple of years ago in 1981 and currently am a practicing architect in Alexandria, VA.

I am here today on behalf of the AIA; and last August, when you had hearings previously, I was also a participant, not representing the AIA at that time, but just as a practicing architect.

We'd like to first of all commend the subcommittee for the diligent interest in this area of great concern to our profession of architecture and of engineering. On the whole, we feel the report is a valuable effort to sort out the difficult issues surrounding structural failures.

We would, however, like to clarify our position on two of those six factors that you set forth in your findings and recommendations. The first has to do with section E, the selection of architects and engineers; and the second has to do with section F, timely dissemination of technical data.

In responding to the section on the selection of architects and engineers, I think there was some confusion over the low bid problem, as stated in the report, in the selection of architects and engineers for projects funded by the private sector, as opposed to architects and engineers selected by Government or the Federal, State, and local governments.

The AIA endorses and supports selection of architects and engineers for Federal building projects on the basis of professional qualifications and competence as mandated in Public Law 92-582, referred to as the Brooks bill. The AIA also endorses this procedure for State and local governments and many or most State and local governments do use this—some modified form of the Brooks bill in their selection criteria. Currently 23 States utilize a qualification-based AE selection for State-funded projects.

I think you know that the Brooks bill requires public announcement of all contract requirements, submission of the qualifications by the AE, interview of a short listed group of firms of usually five to eight, and selection and ranking of the three most qualified firms, and then negotiations take place with the highest ranking firm and all aspects of the project are considered at that time, including costs. Qualifications-based selection procedure is firmly in place and if a Government owner cannot negotiate a satisfactory contract with this highest ranking firm,—then they move on to the second most—second highest ranking firm and the agency undertakes negotiations with them. Failing an agreement with the second-ranked firm, they move on to the third-ranked firm.

Selecting architects for public projects on the basis of demonstrated qualifications and not on the basis of cost in our view is in the best public interest. A qualifications-based system of selecting architectural services fosters an atmosphere of trust and confi-

dence between the owner and architect and not an adversary type relationship that might take place if you—if you use cost.

The public and the profession are well served by ensuring the best architectural services are procured. Now, you may have seen the article in the Washington Post yesterday regarding some threats to the Brooks bill and I can only state our strong feeling that this is a workable solution, a workable system that is now in place, and I hope that people, such as your committee, can take some positive action in supporting the present system that is in place.

The committee report, I feel, was somewhat misleading in suggesting that Federal procurement of architects, and engineers is in any way based on price considerations. It is not at this time, even though, as I say, it is threatened. All Federal agencies must follow the Brooks bill when procuring the services of architects, and the AIA has long endorsed this procedure and I feel that the committee report should be corrected to reflect that reality.

As we testified last year, the AIA supports efforts to promote the timely dissemination of technical data. The availability of factual unbiased and readily accessible information is critical in the prevention of future tragedies. As a result of recent efforts, the University of Maryland's Architecture and Engineering Performance Information Center has become the repository for information on all types of building failures. AEPIC, as it's called, A-E-P-I-C, has already placed over 40,000 incidents on computer files.

Originally funded in part by a National Science Foundation grant, it is supported by the architectural and engineering professions, modestly as it is nonetheless supported—modestly financially, I mean—and should be the model for any future efforts to record structural failures.

The AIA supports—in fact, strongly supports—AEPIC's involvement in the expanded activity of the National Bureau of Standards anticipated by the committee's recommendation. Its continued funding will guarantee the private sector's involvement that is essential to this activity's success.

I could only reiterate that AEPIC is a fairly new organization at the University of Maryland. It's moving along well. It has been funded to get started by the National Science Foundation grant, and now it's existing on private funding, and I feel it has some great opportunities and one that your committee ought to definitely be aware of.

With regard to the National Bureau of Standards, the AIA recommends that several points be emphasized in respect to the language included in 307(a) of H.R. 5172. First, it is important to emphasize that the Director of the Bureau should have full discretion in ordering an investigation. Not all failures have applicability, of course, beyond the local setting and many State and local agencies exist to address these local concerns; but nonetheless, a Director of the Bureau should have this discretion in ordering an investigation.

The need in many of these cases is not investigatory, but rather the dissemination of findings and that's, of course, what my profession is interested in, learning about the findings.

Second, the AIA is concerned that NBS at the present time lacks a capacity to conduct a large number of investigations because of some recent reductions, in force. I think that that's a real threat because there have been reductions, and so a large number of investigations probably would not be possible.

The AIA urges the use of outside experts to address highly technical matters in areas where NBS lacks that expertise.

And third, the AIA encourages recognition by the National Bureau of Standards of the work of model code organizations and their promotion of national standards. The consistent adoption and enforcement of model codes can avert or mitigate many tragic occurrences. The AIA supports that adoption of enforcement of building codes and standards that are the product of informed education research and review.

The AIA also supports active participation of the architect and the public in a consensus process. Investigations by the Bureau should be based upon such consensus-based, needs-tested criteria.

Let me just comment there for a minute. Building codes around this country vary greatly from area to area, from section to section. In this area alone, we have a building code in Virginia; we have a building code in the District of Columbia that's different; we have a building code in the State of Maryland that's different. Not too many years ago, all throughout the State of Virginia, for example, were different building codes in every jurisdiction, and somebody trying to practice architecture and engineering had to get familiar with a different code in a different locality. The more we can bring together these national standards and try to get some uniformity of standards and codes, I think the better it will be for the practicing architect and engineer and the better it will be for the safety of buildings.

Finally, the AIA strongly supports the exemption of information collected by the Bureau from use in any suit or action for damages growing out of its investigation. This point is especially critical in this litigious area we're in today to the AE professions that have been victimized by so many third-party lawsuits, laborious hearings, and depositions.

The National Transportation Safety Board's integrity and thoroughness appear to provide a good example of how such investigations should proceed.

In conclusion, I want to reiterate that the AIA is supportive of the recommendations of the committee. As you've learned, the causes of structural failures are certainly varied and no one segment of the construction industry has total control over this complicated process that we have today from the early design stages through final construction. The architect has traditionally been the coordinator of the process with the responsibility shared by engineers and construction managers and other professionals. The AIA, through its Codes and Standards Committee and Life Safety Task Force, has worked diligently to mitigate structural failures, and we welcome the constructive involvement of Congress in promoting the safety of our citizens.

Thank you for this opportunity to appear before you again and, on behalf of the AIA, I offer our continued support and resources.

[The prepared statement of Mr. Vosbeck follows:]

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EXAMINING STRUCTURAL FAILURES IN PUBLIC FACILITIES

A STATEMENT BY
R. RANDALL VOSBECK, FAIA

ON BEHALF OF

THE AMERICAN INSTITUTE OF ARCHITECTS

BEFORE
U.S. HOUSE OF REPRESENTATIVES
SUBCOMMITTEE ON OVERSIGHT AND INVESTIGATIONS
COMMITTEE ON SCIENCE AND TECHNOLOGY

APRIL 25, 1984

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Mr. Chairman, my name is R. Randall Vosbeck and I am a practicing architect in Alexandria, Virginia and past President of The American Institute of Architects. I am here today on behalf of the AIA, the professional association representing this nation's architects.

Last August, the AIA participated in the hearing which resulted in the Committee Report we are commenting on today. We would like to commend the Subcommittee for its diligent interest in an area of great public concern. On the whole, the Report is a valuable effort to sort out the difficult issues surrounding structural failures. However, we would like to clarify our position on two of the six factors upon which the Committee has made its findings and recommendations. The first is Section E, Selection of Architects and Engineers and the second is Section F, Timely Dissemination of Technical Data.

In responding to Section E, there appears to be some confusion over the "low bid" problem in the selection of architects and engineers for projects funded by the private sector, as opposed to architects and engineers selected by governments - federal and state and local. The AIA endorses and supports the selection of architects and engineers for federal building projects on the basis of professional qualification and competence, as mandated by the Brooks Act, P.L. 92-582. The AIA also endorses this procedure for state and local governments. Currently, 23 states utilize a qualifications-based architect/engineer selection procedure for state-funded projects.

The Brooks Act requires public announcement of all contract requirements, submission of the qualifications by the architect/engineer, interview of the short list of approximately five to eight firms, and selection and ranking of the

three most qualified firms. During contract negotiations with the highest ranking firm, all aspects of the project, including cost, are considered. A qualifications-based selection procedure is firmly in place. If the government owner cannot negotiate a satisfactory contract with this highest-ranked firm, negotiations end, and the agency undertakes negotiations with the second-most-qualified firm. Failing an agreement with the second-ranked firm, the agency begins negotiations with the third-most qualified firm.

Selecting architects for public projects on the basis of demonstrated qualifications, and not cost, is in the best interest of the public. A qualifications-based system of selecting architectural services fosters an atmosphere of trust and confidence between the owner and the architect. The public and the profession are well served by insuring the best architectural services are procured.

The Committee Report is most misleading in suggesting that federal procurement of architects and engineers is in any way based on price considerations. All Federal agencies must follow the Brooks Act when procuring the services of architects and engineers, and The American Institute of Architects has long endorsed this procedure. The Committee Report should be corrected to reflect this reality.

As we testified last year, the AIA supports efforts to promote the timely dissemination of technical data. The availability of factual, unbiased and readily accessible information is critical to the prevention of future tragedies. As a result of recent efforts, the University of Maryland's Architecture and Engineering Performance Information Center (AEPIC) has become the repository

for information on all types of building failures. AEPIC has already placed over 40,000 incidents on computer files. Originally funded in part by a National Science Foundation grant, it is supported by the architectural and engineering professions and should be the model for any further efforts to record structural failures. The AIA strongly supports AEPIC's involvement in the expanded activity of the National Bureau of Standards anticipated by the Committee's recommendation. Its continued funding will guarantee the private sector's involvement essential to this activity's success.

With regard to the National Bureau of Standards, the AIA recommends that several points be emphasized in respect to the language included in Section 307(a) of H.R. 5172. First, it is important to emphasize that the Director of the Bureau should have full discretion in ordering an investigation. Not all failures have applicability beyond the local setting, and many state and local agencies exist to address these local concerns. The need in many of these cases is not investigatory, but rather the dissemination of findings.

Second, the AIA is concerned that the National Bureau of Standards lacks the capacity to conduct a large number of investigations due to recent reductions-in-force. The Institute encourages the use of outside experts to address highly technical matters in areas where the National Bureau of Standards lacks expertise.

Third, the AIA encourages recognition by the National Bureau of Standards of the work of the model code organizations and their promotion of national standards. The consistent adoption and enforcement of model codes can avert or mitigate many tragic occurrences. The AIA supports the adoption and

enforcement of building codes and standards that are the product of informed education, research and review. The AIA also supports active participation of the architect and the public in a consensus process. Investigations by the Bureau should be based upon such consensus-based, needs-tested criteria.

Finally, the AIA strongly supports the exemption of information collected by the Bureau from use in any suit or action for damages growing out of its investigation. This point is especially critical to the architectural and engineering professions that have been victimized by third party lawsuits and laborious depositions and hearings. The National Transportation Safety Board's integrity and thoroughness appear to provide a good example of how such investigations should proceed.

In conclusion, the AIA is supportive of the recommendations of the Committee. As you have learned, the causes of structural failures are varied and no one segment of the construction industry has total control of the building process from early design stages to final construction. The architect has traditionally coordinated this process with the responsibility shared by engineers, construction managers and other professionals. The AIA, through its Codes and Standards Committee and Life Safety Task Force, has worked diligently to mitigate structural failures, and we welcome the constructive involvement of the Congress in promoting the safety of our citizens.

Thank you for the opportunity to appear before you. On behalf of AIA, I offer our continued support and resources. Please call upon us at any time.

Mr. GORE. Well, thank you very much.

Let me begin the questions by—with a comment. Mr. Karn, we, in drafting the legislation, did not in any way intend that the authority of the National Bureau of Standards be preemptive. In fact, language which would have made its authority preemptive of State and local jurisdictions was removed from the bill so as to make it clear that they are supposed to cooperate with local and State authorities.

Second, investigations are undertaken only at the discretion of the Director of NBS, and that full discretion is, again, intended to facilitate the kind of cooperation that we agree with you should be involved here.

Now, the model agreement between State and local jurisdictions and NBS which the National Conference of States on Building Codes and Standards is now attempting to work out, is precisely the kind of close cooperative working relationship that we envision. So I hope—I hope that statement will allay your concerns about NBS coming in, in a preemptive manner, and overriding State and local jurisdictions. That's simply not intended, and the language was carefully drafted to avoid that.

Now, as for your statement that NBS currently has all necessary authority to undertake investigations when invited, that's simply not the case, I would respectfully suggest to you. We had an exchange in our hearing last—last time, in which Dr. Pfrang participated, when he was wearing a different hat. Dr. Wright and Dr. Pfrang testified that a timely investigation is necessary before rescue operations make it difficult to execute such an investigation, yet, as—as many are aware, the owners of the Kansas City Hyatt denied access to that building until the mayor's office intervened and the NBS did not have the authority that it needed to go in.

Now, if the NBS has the legal authority and is required to work in a cooperative manner with the State and local authorities, then that gives a little additional leverage to the investigators to get in, to find out what happened, even in circumstances where the owner of the structure is so concerned about liability that he or she wishes to exclude investigators. That's really what that provision of the bill is—is intended to accomplish.

Now, Mr. Wolfe, I hope that that statement also allays your concern about what you characterize as an unclear language about the nature of the preemptive authority. When—when laws are acted upon, when language is removed, that has a specific meaning in the legislative history, as does—as do the statements of the subcommittee about what the bill is intended to accomplish.

I might also say that in our negotiations with the other body, this has been an important matter as well, and we will—we will clarify when the conference version comes to the floor that—how this developed and clarify the preemptive authority is not what is established and that full cooperation with State and local authorities, perhaps on the basis that Mr. Wolfe's organization is in the process of working out, is really what is intended.

So, I take your comments in a constructive fashion and I hope that—I hope that that meets your concerns.

Mr. KARN. Mr. Chairman, we have not reviewed that model agreement that you're talking about. All we looked at was the sec-

tion 307 with the language there and our concern was based on the language that's in there.

I might ask Dr. Pfrang to comment further on that.

Mr. GORE. Fine.

Dr. PFRANG. We certainly would endorse the approach that the National Conference of States on Building Codes and Standards has put forth here today, where they would establish in advance model agreements which could be executed. However, we still question whether additional legislation is necessary in this area in that the National Bureau of Standards, as was adequately demonstrated in the case of Kansas City, has the authority currently to enter into an agreement with any jurisdiction that requests—so requests its assistance. The current language which would call for NBS to enter into such investigations on its own initiative is what is of concern to us.

Mr. GORE. Well, it did not have the authority to get into the building. Do you agree with that?

Dr. PFRANG. And would not under this legislation. All it has—all that it could do is enter into an agreement, as I understand——

Mr. GORE. No; your understanding is not correct, Dr. Pfrang. Under this legislation, it would be given the new authority——

Dr. PFRANG [continuing]. It would have——

Mr. GORE [continuing]. To get into buildings.

Dr. PFRANG [continuing]. Powers to enter in and——

Mr. GORE. It would have—it would have the ability to investigate structural failures upon the discretion of the Director and in cooperation with State and local authorities.

Dr. PFRANG [continuing]. And under what police power would it be operating so that it could secure the site, something that the mayor of Kansas City was unable to do?

Mr. GORE. Well, the phrase "police power" is your phrase; it's not ours. We're not conferring a police power. We're giving it the authority to investigate the structural failures and actions such as those by the owner of the Kansas City Hyatt are what make such authority advisable, in my opinion.

Mr. PFRANG. I still don't see how this legislation would have changed the situation in Kansas City, where the mayor was himself pleading with the owners of the Crown Center not to remove the debris, but he did not feel that he had the authority to stop them.

Mr. GORE. Well, the way it would change it is that it would give the National Bureau of Standards the legal authority to enter the premises.

Dr. PFRANG. Then that would be a preemptive authority.

Mr. GORE. Well, it would be exercised only in cooperation with the State and local authorities and only at the discretion of the Director of the NBS. The word "preemptive" is, I respectfully suggest, misused in that context; they are not preempting the State and local authorities in that situation. They are preempting the owner of the building, who is in that circumstance unjustly and unwisely denying investigators access to find out what happened. They are assisting the State and local authorities by giving them additional leverage to find out the causes of the structural failure.

Dr. PFRANG. Then I submit for your consideration that giving someone the power to preempt the rights of an owner is giving them police power.

Mr. GORE. Well, you—is it your position that the owner of a facility like the Hyatt, where—how many people were killed, 100 and——

Dr. PFRANG. 114.

Mr. GORE [continuing]. Where 114 people were killed, with not dissimilar structures around the country, with great public concern about the standards used, is it your position that the owners of that facility ought to have the legal right to prevent any investigation of what has caused the death of those 114 people?

Dr. PFRANG. I'm not debating that point; I'm just——

Mr. GORE. Well, I am. I am. You are opposed to that provision of the bill and I'm—and that's the reason for the provision so I just want to ask you, do you think that the owner of the building ought to have the right to prevent an investigation of what caused the death of those 114 people?

Dr. PFRANG. I think that the legal mechanisms for the conduct of such investigations currently exist. For example, Jackson County has undertaken an investigation to look into the cause of that collapse.

Mr. GORE. Well, now, Dr. Pfrang, in your testimony—before you went to work for the organization you're now working for—in your testimony at our last hearing, you pointed out, in your own words, how necessary it was to get timely information before the cause of the failure is—is—is—is made inaccessible by the operations ongoing at the site.

You pointed out to the subcommittee how important it was to allow the investigators of structural failures to see exactly what happened before the evidence was gone. You remember telling us that?

Dr. PFRANG. Yes, I do and I still strongly support that position.

Mr. GORE. And they did not have the legal authority to do that in the—in the Hyatt. Now, the owners finally relented when the publicity and the mayor and all of that got more than they could bear, but this is something that was not legally possible in the situation where the Hyatt was concerned.

Dr. PFRANG. I agree with you on that and it is for that reason that I support the approach that the National Conference of States on Building Codes and Standards has proposed, where these agreements be established in advance, and I do not feel that additional legislation is necessary in order to accomplish that. I feel that the National Bureau of Standards already has the authority to do that, unless you are planning to give them additional police power, which I don't think you are proposing.

Mr. GORE. Well, they didn't—again, I don't want to belabor this point. I also support the approach of the National Conference of States on Building Codes and Standards. We need that sort of model agreement, but when you say in your organization's prepared statement this morning that no additional authority is needed, it simply overlooks the fact that under current law, NBS does not have the legal authority to go to a site like the Hyatt and investigate what caused the failure.

Dr. PFRANG. They have——

Mr. GORE. We think it should have that power.

Dr. PFRANG. They have that legal authority currently, provided that they are invited in by the local or State jurisdiction.

Mr. GORE. And if—well, the—no, no. Provided that—provided that the owner of the facility allows them to look at the causes of the failure and—and if, as happened in the Hyatt case, the owner of the facility denies access, then they currently have no legal authority to look at it.

Dr. PFRANG. You have to then operate under the police power of that jurisdiction.

Mr. GORE. Well, I mean, you seem to have this—this insistence on using the word "police." They ought to have the authority, in my view, to be able to investigate that failure.

I mean, I really—I don't—I'm surprised, really, that—that you take the approach that you do this morning. It comes as a surprise.

We didn't get your statement until late last night and all of a sudden, this is in it. This is based partly on—on your testimony to us in our last hearing, Dr. Pfrang, and what we're trying to work out is a cooperative relationship between NBS and the local and State authorities, and at the same time, give the NBS a new authority to make certain that situations like those accompanying the Hyatt disaster don't—aren't repeated. I mean, we can—we can disagree, but would you—I mean, let's take the situation of the National Transportation Safety Board.

Is it—would you have the owners of aircrafts have the legal authority to deny NTSB investigators access to the crash site until they had met with their lawyers; until the owners of the airplane had met with their lawyers and resolved all their litigation concerns and then make the NTSB wait and—until later on? Shouldn't they have immediate access to the crash site so we can prevent future crashes?

Mr. PFRANG. I think we have a totally different situation when we talk about transportation accidents, particularly aircraft accidents, where there is a very clearcut Federal role. Because it is a federally regulated industry, the Federal Government establishes the standards under which they operate. These are mandatory standards which are placed on the industry.

In the case of building construction, we have in the United States operated under a system whereby the States have the responsibility for assuring the health and well-being of individuals as it is—that health and welfare is influenced by buildings, and I don't think that it is appropriate that we change that situation and try to adopt the approach that is currently used by the National Transportation Safety Board.

Mr. GORE. Well, we're not proposing regulation or Federal standards. We're proposing the collection of critical information so that the national professions involved here can learn from the mistakes that have been made.

The parallel is that time is of the essence when a crash occurs and that is why the NTSB is given timely access to the information necessary to investigate the cause of the crash. Time is also of the essence in the investigation of major structural failures and that's

why the NBS ought to have timely access, at the discretion of the Director, in cooperation with local and State officials.

Was anything removed from the Hyatt site prior to the investigation of that structural failure?

Dr. PFRANG. Oh, yes, all of the debris was removed before the investigation actually got started.

Mr. GORE. Did that hamper the investigation of the cause of the structural failure? Did it make it more difficult?

Dr. PFRANG. It slowed the investigation down.

Mr. GORE. Slowed it down?

Dr. PFRANG. Yes.

Mr. GORE. And made it more difficult.

Dr. PFRANG. More expensive, certainly.

Mr. GORE. Yeah. Well, shouldn't—I mean, shouldn't we solve that problem? I mean——

Dr. PFRANG. I—I—I fully agree that we should solve it and I think we should be doing that in a cooperative mode. That's the reason that I support this approach that has been put forth today of establishing in advance model agreements which rely on already-existing authority.

Mr. GORE. Well, we don't disagree at all on that——

Dr. PFRANG. No.

Mr. GORE [continuing]. The only thing we disagree on is whether or not the—the NBS ought to have the authority, when acting cooperatively in accordance with model agreements, and at the discretion of the Director, whether under those circumstances the NBS ought to have the authority to get into a site like the Hyatt before items are removed while the investigation can be conducted.

I think the facts speak for themselves, but you can disagree if you like.

Mr. Skeen.

Mr. SKEEN. Thank you, Mr. Chairman, this has been a very interesting dialog and I would say to the panel over there, I think that when we discuss the language, and if you—I don't know whether you've had the opportunity to read the report language in the bill, and I think you may have—I think the—I want to reinforce what the chairman has said, that we took particular pains to try to write the kind of language that would not be preemptive and not give the kind of authority that would be unduly allocated to a group like the National Bureau of Standards and the rest, and also, it specifically states in the report language that the committee wishes to emphasize that the NBS would not have a regulatory role in the construction industry.

My only concern was that in the absence of model agreements, which I think is a correct approach for this kind of cooperation and support, and that's what the whole thrust of what we try to do with the language because NBS itself maintains that they did not have the proper statutory language within their mission mandate to—and they want to stay in a supportive and a cooperative role far more than one that's initiative—and so I would also like to just reinforce the attitude of the committee wasn't to give police power—someone had to exercise police power somewhere down the line, evidently, in this particular case, and I'm sure that NBS doesn't want police power, but then they had to—they probably

had to rely on someone else's to get anything, so so much for that argument and we were trying to help, but as usual around this place, sometimes all the help we can give you can hurt you a whole lot. But we appreciate your—your imput in this, and I would appreciate it if you would critique the report language, and if we could make it any clearer that what our intent was and one that was cooperative and supportive of the local agreements and if they are in existence, but also find a way around a case like the Hyatt, which we used as a bad example. I would certainly appreciate that kind of help.

Thank you, Mr. Chairman.

Mr. GORE. Mr. McCandless.

Mr. MCCANDLESS. Thank you, Mr. Chairman.

The one point here, and I again apologize for not having been involved in this earlier, needs further clarification because we've been around it and I would ask this question of the gentlemen in their critiquing the language of the current bill: that given the passage of this language; given the circumstances that have been outlined here previously, and the term "in cooperation with local jurisdiction," that in the event it was deemed by the Director that it was in the best interest of health, welfare, safety of the public, that this language would permit the entry into the facility or the debris of the facility, irrespective of the action or lack of action of the jurisdiction in question.

Is that your understanding? So the word "in cooperation with" is a hopeful word, but not essential if the Director wished to pursue a course of action under this legislation.

Have I made my point clear for question purposes or is it foggy or what?

Mr. VOSBECK. Unless there's some previous agreement, I think, between the local or State authority and NBS about the circumstances.

Mr. GORE. In this hypothetical situation that I am developing this question around, there is no agreement.

Mr. VOSBECK. Oh, there is none.

Mr. MCCANDLESS. But there is a strong feeling on the part of the administrator involved. The Federal Government needs to get involved as the Bureau of Standards. Now, is it your understanding that the language permits that?

Dr. PFRANG. Yes.

Mr. VOSBECK. Yes.

Mr. MCCANDLESS. Irrespective of whether or not it's in cooperation with? That if the local jurisdiction, for whatever reason, said, "Well, we don't think it's timely to do anything yet," and they've come to that conclusion, whatever the reason may be, the Bureau of Standards says, "We disagree with you;" they would have the authority—the word "police power" is used, which is descriptive—they would have the authority to move in and do what they wished.

Is that your understanding? Literal interpretation?

Mr. WOLFE. A literal reading of the bill, as I have it here, certainly would give them that authority.

Mr. MCCANDLESS. Right. This is the problem I have, Mr. Chairman, there seems to be a difference of opinion in the interpretation

of the language. If I understood the dialog that preceded my question, this was not necessarily the case. Is there some clarification there that we might make?

Mr. GORE. Well, the intent of the bill is to—is that this authority always and in every circumstance be exercised in cooperation with local and State authorities. The giving of discretion to the Director is intended to require that, and the elimination of preemptive authority language from the section was also intended to do that.

Now, I take it that there is concern on the part of several witnesses that that is not as clear as it should be. I can only say that that is the intent of the language and we will make that intent crystal clear when the bill comes back to the floor in a conference version after the Senate passes it, and I'm sure, based upon our staff's conversations with the staff on the Senate side, that that's going to be made crystal clear when the Senate passes it as well. But certainly that's our intent and I think it can be clarified quite easily.

Mr. MCCANDLESS. If you may permit just one more thought to be expanded on, in the event that there is objection to the involvement of the Bureau of Standards under this language by the jurisdiction in question, the language would then permit the Bureau of Standards to move ahead anyhow, irrespective; is that your understanding—my understanding of the intent? If it were to be pursued by the Director?

Mr. GORE. It does not have, under this language, preemptive authority. If it had been—if we had wanted to give it preemptive authority to act in accordance with your hypothetical, there is language of art that is routinely put in to donations of authority or grants of authority to Federal agencies giving them preemptive authority. If we had wanted to do that, that specific language would have been in there.

The absence of that language can be interpreted to limit the authority of the NBS to move only in certain circumstances.

Now, the nature of those circumstances is what needs to be spelled out and clarified. All of this would be spelled out and clarified with the adoption of model agreements that would govern the interaction between the NBS and State and local authorities. But to answer your specific question; they would not have the clear legal preemptive authority to move without the cooperation of State and local governments.

Mr. MCCANDLESS. Would it be objectionable to have some clarifying language to that effect?

Mr. GORE. No, I've been saying that—that we will clarify it. I will personally clarify it in accordance with what I take to be the sentiments expressed here when the bill comes back from conference, so as to make certain that the original intent of the legislation is the intent that all see when they read the legislation in the legislative history.

Mr. MCCANDLESS. I guess, Mr. Chairman, at the point of overkill, my concern is that the Bureau of Standards, and this is a force by which the ingredients of the structure and their integrity or lack thereof is the aspect around which the Bureau of Standards finds its interest. In other words, the other aspects, rather than the number of pound steel, the type of concrete that was selected or

the mix of the concrete or whatever else might be, those components that went into the actual construction.

I have concern that we maintain that distinguishing factor between the standards of the construction material——

Mr. GORE. Uh-huh.

Mr. MCCANDLESS [continuing]. Versus the standards and the engineering and design of the structure.

Mr. GORE. Will the gentleman yield?

Mr. MCCANDLESS. Certainly.

Mr. GORE. This is not a new role for the National Bureau of Standards. They have already been performing this role for a long time.

Mr. MCCANDLESS. Yes, I understand that, Mr. Chairman, but there appears to be in the dialog that we have had here so far this morning some question as to why we may be moving into that other area——

Mr. GORE. They are already into that other area; that's what I'm saying. The Center for Building Technology has been conducting investigations of this kind and compiling information of this kind for a long while. The lead role of the National Bureau of Standards, in my opinion, is advisable to make certain that we collect and collate a central repository of information, most probably with AEPIC playing a key role as a repository.

But it is not a new role for the NBS to look at the causes of structural failures.

Mr. SKEEN. Would the gentleman yield?

Mr. MCCANDLESS. Yes, sir.

Mr. SKEEN. I think that's made clear, too, in the latter part of the report language that any conclusions and recommendations made by the NBS as a result of any investigation would be only advisory, rather than regulatory.

Mr. GORE. Right.

Mr. MCCANDLESS. Thank you, Mr. Chairman.

Mr. GORE. Well, thank you.

Let me add one other thing that the legislative counsel was—legislative counsel specifically advised the—the subcommittee staff when this language was drafted that it would probably not override local authorities if challenged, so it was specifically designed not to be preemptive.

Let me say that the subcommittee regrets that Mr. Gerald Farquhar could not be here today. We really don't know what happened to him. We had expected him, but—and we wish him well and hope that there are no serious problems.

One of the questions that I wanted to pursue with him I will state for the record and that is, the suggestion has been made that if insurance companies were to require that clients utilize the kind of data base that NBS and AEPIC are hopefully going to compile, then that would—and require that their clients check on previous failures of designs similar to the ones that are about to be used and that would increase participation—do any of you all think that that would be—Mr. Farquhar was going to comment on the insurance aspect of it, but I'm interested if any of you think that's a good suggestion or something that ought to be promoted or not?

Mr. Vosbeck.

Mr. VOSBECK. I don't know that I quite understood the——

Mr. GORE. Well, again, Mr. Farquhar would be the appropriate one to address this because he deals with the insurance aspect of the problem, but if insurance companies giving insurance on a major structure, a major project, were to require as a condition of insurance that the architects and engineers make a routine check of this data base that we're trying to put together to look at structures similar to it, designed similar to it, to see if there've been problems, wouldn't that increase participation in the AEPIC program and the NBS program?

Mr. VOSBECK. Well, on the surface, it would appear that way. I am sure it has some administrative problems with it, but I would think that——

Mr. GORE. Yeah, I mean, again, that's not a suggestion for Federal action, but something for the insurance companies to consider.

Dr. PFRANG. Mr. Chairman, may I comment on that?

Mr. GORE. Sure.

Dr. PFRANG. I've had a number of discussions with insurance people and other design professionals with regard to this question and there is a serious concern about the insurance companies requiring that design professionals follow a specific spelled-out procedure in order to maintain their insurance coverage which is, I think, the direction that this would go in.

We would get into a situation where someone outside of the design professions would start to mandate the way we carry out our professional responsibilities and I think that would be a major shortcoming. In addition to that, the feeling within the insurance companies, the insurance industry, tends to be that they would also have problems with this because then a design professional could raise this requirement as a defense against certain suits that might take place.

So it does have some very significant problems that need to be examined in more detail before anybody seriously proposes that approach.

Mr. GORE. All right, that's very helpful. That's one of the reasons I asked the question, to see if there might be some problems with it.

Mr. Wolfe, it has been asserted to the subcommittee that many times the design of standards and codes come about with the reliance on essentially anecdotal information. Is that an unfair comment? I mean, we've been told that sometimes codes are designed just because somebody heard of a failure once from a graduate school friend and this works its way into the codes; is that—does that happen?

Mr. WOLFE. Well, Mr. Chairman, I think there is certainly some credence to that. We all tend to respond to crises, I believe, and it is certainly true of the model codes and some of the States, also, who write their own codes. If there is a tremendous problem in their jurisdiction, they are going to respond and there may be some changes or exceptions taken into the standard to address that one problem, indeed.

Mr. GORE. Mr. Vosbeck, AIA is—is financially supporting AEPIC, is that correct, or you're considering doing so?

Mr. VOSBECK. Considering doing so and individual members are supporting it.

Mr. GORE. I see. I see. Precisely what sort of advantage can a center like this afford your members?

Mr. VOSBECK. Well, I—I think it's clear that we, as a profession, need some sort of a repository of information that we can go to and with some credibility to investigate and to examine past performances, and I think that as AEPIC builds a data base and as that knowledge gets out into our profession, it will be a part of our helpful process in the way we go about carrying out design and the way we investigate particularly new techniques and new procedures and new methods of doing things.

Right now, we really have to rely upon, many times, the people who are, for example, manufacturers or promoters of a new system or a new technique for our technical data because we do not have within our profession research capabilities and the way to examine new systems and new products and so on.

So, if there is some central clearinghouse that can assist us in that regard, I think it would be extremly helpful.

Mr. GORE. Do you agree, Dr. Pfrang?

Dr. PFRANG. Oh, yes, very strongly. I think that having AEPIC functioning can be very useful to our professions in a number of ways. One, it can help us in focusing our research efforts. It can point out to us problems that exist with our current practice, particularly in terms of standards and other design aids, so I think it is very important to us.

Mr. VOSBECK. I'm not sure, Mr. Chairman—this AEPIC is a great concept and I—I'm concerned about financial support, frankly——

Mr. GORE. Yeah.

Mr. VOSBECK. The AE profession is—is not the most productive now from a financial standpoint, and to ask the profession itself to support it, while I am sure they will help and participate, we need to find ways to build this AEPIC and to build it—a better base and a stronger base and it needs financial help.

Mr. GORE. Well, I think one of the things all of the participants in these hearings agree on is the advisability of having a central repository of information so that we can learn from the mistakes, which seems to an outside observer to be occurring more frequently in major public structures, and obviously AEPIC is making a good start. But I agree with you, that to ask architects and engineers to provide all the funding for this kind of center may be unrealistic and this is one of the reasons why the legislation that we're discussing has been proposed and one of the reasons why I sought to make it clear in earlier exchanges that AEPIC may be an ideal repository for NBS to consider and hopefully that relationship can be worked out.

Again, the only disagreement that I think we have is on the granting of authority to NBS to investigate failures, and perhaps we'll just have to disagree on that. I—I didn't realize until this morning that there was any disagreement on that and as my colleague, Dr. Skeen, said before, "We're trying to help," and I thought that this was something that the professions involved were interested in. We got an enormous amount of positive feedback from the first hearing on the addressing of these problems, and

having identified them and described them as best we can, we're going to move forward with the solutions that we think are needed here.

But I want to thank all members of the panel for participating here today. We appreciate your testimony and the responses to questions.

Thank you.

Our final witness is Dr. Richard N. Wright, Director of the National Bureau of Standards with the Department of Commerce. Dr. Wright, if you would come forward, we are delighted to have you here.

Without objection, the entire text of your prepared statement will be put into the record and we invite you to summarize those portions of it that you care to summarize. Welcome.

STATEMENT OF DR. RICHARD N. WRIGHT, DIRECTOR, NATIONAL BUREAU OF STANDARDS, DEPARTMENT OF COMMERCE

Mr. WRIGHT. Thank you, Mr. Chairman, and members of the subcommittee. I will summarize the highlights of the statement.

In hearings before this subcommittee August 3, 1982, I discussed technical causes for structural failures and means to mitigate them. Today I appreciate the opportunity to describe an equally important aspect of building failures; that is, how information on these failures is disseminated, and problems which face those who would like to see even broader dissemination of accurate technical information.

I want to reiterate the point that Dr. Vannoy made about the different kinds of building failures that are important. Functional failures occur when structures do not adequately support their intended function. For instance, a building with a disturbingly flexible floor is an example.

Durability failures occur when structures do not achieve their intended service life. A prematurely deteriorating bridge deck is an example.

Collapses are the failures most hazardous to life and property, and the 1981 Hyatt skywalk collapse is among the most notable. But each of these failures—each of these types of failures—is significant because each can and does cause extreme losses of life and property, or at least the latter.

There are two different causes for failures that we've been discussing this morning: technical and procedural. Technical refers to the physical mechanisms that lead to a failure. These must be understood if we're to develop building practices that will preclude the repetition of such failures.

Procedural causes are failures to follow established safe building practices. Both types of failures are important. It is important to disseminate information on the causes of failures for two reasons: First, this information gives the building community the knowledge it needs so that similar failures will not happen again; second, it aids in identifying areas where our knowledge of building performance is inadequate and where research is needed to improve building practices. Each failure can be a valuable, if unfortunate lesson, to be used to prevent future failures.

As we've heard this morning, there are severe constraints to dissemination of information on structural failures. Most are reported in the popular and trade press, but the coverage often is limited to a superficial description of the incident. The writers frequently lack knowledge of either the technical or procedural causes of failures to share with their readers.

Many investigations of structural failures are conducted to establish not just the cause, but also the legal responsibility for failure. In these instances, court proceedings and protracted litigation often delay or even prevent the release of valuable information obtained in these investigations.

Moreover, engineers' and manufacturers' findings from their own failure investigations can be held as very valuable proprietary information, rather than made public, and professionals involved in failures may, indeed, be reluctant to publicize information that might adversely affect their reputations.

The National Bureau of Standards has investigated the technical causes of many major structural failures. Reports of these investigations have been made public promptly and the results have been widely disseminated. A list of NBS reports and articles based on these reports is attached to this testimony.

For example, over 800 copies of our report on the collapse of the skywalks at the Hyatt Regency Hotel in Kansas City were distributed to design professionals, researchers, educators, Federal, State, and local government representatives, building code bodies, and standards organizations. In addition, we prepared an article for Civil Engineering magazine, a publication with a circulation of over 90,000 civil engineering professionals.

Numerous presentations of the results were made at technical meetings and to university groups by NBS researchers.

We also made the results of our investigation public at a news conference and through news releases that were used widely in both the technical and the general news media.

I'd like to emphasize that in-depth, unbiased studies like these are particularly valuable because they are open to professional review and peer discussion. We have to defend the findings publicly; we have to stand up to scrutiny. As a result, these recommendations are tested by experts in public, and a consensus can be achieved on the technical causes of the failures.

Dissemination of good information on the technical and procedural causes of structural failures is essential to avoid their recurrence. However, this information must be available in a useful form to those who need it before it can serve this purpose. There are several important mechanisms for this dissemination that I wish to highlight.

First, the building community's concern about avoiding failures results in intense professional and trade press interest in publishing and widely disseminating information on technical and procedural causes of failures. Libraries and the National Technical Information Service, as the repository for information generated or funded by the Federal Government, collect and disseminate published information on failures. Modern information technologies do allow quick and efficient searches for failure information.

Second, regional, national, and international standards and codes organizations, like those that have testified this morning, are actively involved in developing and maintaining recommendations for building practices that will avoid or prevent structural failures. Such organizations collect information on pertinent structural failures, analyze it to understand how their practices might be improved, synthesize improved practices, and disseminate this information very vigorously to their members and to the public.

Incidentally, these organizations often are able to use confidential information, information that has not been publicized but is known to their members. But because of the absence of strong public critique, such information cannot be used as effectively as information that is fully public.

Now, the third major means is a national information clearinghouse on structural failures, such as has been established by the Architecture and Engineering Performance Information Center. This has substantial additional advantages to those of the other two mechanisms.

First, it can provide access to some private information. I would like to caution the subcommittee here that there need to be mechanisms, however, to assure the validity and reliability of anonymous information because what comes out of the information base can be no better than what goes in.

Second, AEPIC can provide syntheses of failure trends and statistics that will have value to the building community beyond that provided by the reports of individual failures. Each user then, doesn't have to develop his own syntheses over and over again.

And third, AEPIC can provide a very convenient collective source for reports of failure investigations.

The National Bureau of Standards focuses its limited resources on developing verified technical information about building performance. One aspect of this is the technical causes of structural failures.

We also participate with organizations which have programs to develop and disseminate information on structural failures. Presently, our researchers serve on dozens of committees of United States and international technical and standards organizations, including those of each organization that testified before you this morning. So we participate as a peer in the analysis of failure information, in the synthesis of practices to avoid failure recurrences, and in disseminating these widely for public use.

Mr. Chairman, I thank you for the opportunity to present this statement and I will be pleased to answer any questions the subcommittee may have.

[The prepared statement of Dr. Wright follows:]

STATEMENT OF
DR. RICHARD N. WRIGHT
DIRECTOR
CENTER FOR BUILDING TECHNOLOGY
NATIONAL ENGINEERING LABORATORY
NATIONAL BUREAU OF STANDARDS
BEFORE THE
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT
COMMITTEE ON SCIENCE AND TECHNOLOGY
HOUSE OF REPRESENTATIVES
April 25, 1984

Mr. Chairman and members of the Subcommittee: In hearings before this Subcommittee on August 3, 1982, I discussed technical causes for structural failures and means to mitigate them. Today I appreciate the opportunity to describe an equally important aspect of building failures -- that is, how information on these failures is disseminated and problems which face those who would like to see even broader dissemination of accurate, technical information.

First, let me point out that there are several different kinds of building failures. Functional failures occur when structures do not adequately support their intended function. A disturbingly flexible floor is an example. Durability failures occur when structures do not achieve their intended service life. A prematurely deteriorating bridge deck is an example. Collapses are the failures most hazardous to life and property. A 1981 hotel skywalk collapse is among the most notable. But each of these kinds of failures is significant because each can and does cause losses of life and property. There are two different causes for these failures: "technical" and "procedural." Technical causes refer to the physical mechanisms that lead to a failure. These must be understood in order to develop building practices that will preclude such failures. Procedural causes are

failures to follow established safe building practices. Both types of failures are equally important; each can have the same result.

It is important to disseminate information on the causes of structural failures for two reasons. First, this information gives the building community the knowledge it needs so that similar failures will not happen. Second, it aids in identifying areas where our knowledge of building performance is inadequate and where research is needed to improve building practices. Each failure is a valuable, if unfortunate, lesson that can be used to prevent future failures.

CONSTRAINTS TO DISSEMINATION OF INFORMATION

Most structural failures involving significant losses of life or property are reported in the popular and trade press. But the coverage often is limited to a superficial description of the incident. The writers frequently lack knowledge of the technical or procedural causes of the failures. While they many times turn up useful information, they are many times inaccurate. In any event, these reports cannot replace in-depth investigations which are required if accurate and complete information is to be disseminated.

Many investigations of structural failures are conducted to establish not just the cause but the legal responsibilities for a failure. In these cases court proceedings and protracted litigation often delay or even prevent the release of valuable information obtained in these investigations.

Moreover, engineers' and manufacturers' findings from failure investigations may be held as valuable proprietary information rather than made public.

Professionals involved in failures may be reluctant to publicize information that might adversely affect their reputations.

INVESTIGATIONS TO DEVELOP INFORMATION

The National Bureau of Standards (NBS) has investigated the technical causes of many major structural failures. Reports of these investigations have been made public promptly and widely disseminated. A list of NBS reports and articles based on these reports is attached to this testimony. For example, over 800 copies of our report on the collapse of the skywalks at the Hyatt Regency Hotel in Kansas City were distributed to design professionals, researchers, educators, Federal, State, and local government representatives, building code bodies and standards organizations. In addition, we prepared an article for Civil Engineering magazine, a publication with a circulation of approximately 90,000 engineering professionals. Numerous presentations of the results were also made at technical meetings and to university groups by NBS researchers. We also made the results of our investigation public at a news conference and through news releases which were used widely in both the technical and general news media.

In-depth, unbiased studies like these are particularly valuable because they are open to professional review and peer discussion. The findings and recommendations are tested in public, and a consensus on the technical causes of failures can be reached.

DISSEMINATION OF INFORMATION

Sound information on the technical and procedural causes of structural failures is essential to avoid their recurrence. However, this information must be available in useful form to those who need it before it can serve this purpose.

The building community's concern about avoiding failures results in professional and trade press interest in publishing and widely disseminating information on the technical and procedural causes of failures. Libraries and the National Technical Information Service (the repository for information generated or funded by the Federal Government) collect and disseminate published information on failures. Modern information technologies allow quick and efficient searches for failure information.

Regional, national, and international standards and codes organizations, trade associations, technical organizations, and professional societies are actively involved in developing and maintaining recommendations for building practices that will avoid or prevent structural failures. Examples are the National Conference of States on Building Codes and Standards, the model building code organizations (Building Officials and Code Administrators International, Southern Building Code Congress International, and International Conference of Building Officials), the American Concrete Institute, and the American Society of Civil Engineers. Such organizations collect information on pertinent structural failures, analyze it to understand how their practices might be improved, synthesize improved practices, and

disseminate the information vigorously to their members and the public. While these organizations are able to use confidential information on failures possessed by their members, such information cannot be used as effectively as information that is public.

NATIONAL INFORMATION CLEARINGHOUSE

A national clearinghouse of information on structural failures could provide an important supplement to the various professional organizations, libraries and information services now collecting and disseminating failure-related information. The Architecture and Engineering Performance Information Center (AEPIC), which was established recently at the University of Maryland with private support and a grant from the National Science Foundation, may perform this function. AEPIC could provide:

(1) Access to some private information. However, the validity and reliability of anonymous information may be a problem.

(2) Syntheses of failure trends and statistics that have value to the building community beyond that provided by reports of individual failures.

(3) A convenient collective source for reports of failure investigations.

The National Bureau of Standards focuses its limited resources on developing verified technical information about building performance -- such as the technical causes of structural failures. NBS also participates with organizations which have programs to develop and disseminate information on structural failures. For example, I am President of the International Council for

Building Research. This organization represents building research organizations from 62 countries. Its technical committees hold symposia, develop reports, and recommend ways to disseminate information about structural failures. Presently, NBS researchers serve on dozens of committees of U.S. and international technical and standards organizations, including AEPIC, that analyze failure information, synthesize practices to avoid failure recurrences and disseminate them widely for public use.

Mr. Chairman, thank you for the opportunity to present this statement. I would be pleased to answer any questions the Subcommittee may have.

APPENDIX A

DISSEMINATED RESULTS OF NBS FAILURE INVESTIGATIONS

WIND/HURRICANE/TORNADO DAMAGE INVESTIGATIONS

- Documented damage caused by the 1969 Hurricane Camille, one of the most intense tropical storms to hit the U.S. Mainland.

  Dikkers, R.D., Marshall, R.D. and Thom, H., TN 569, "Hurricane Camille - August 1969," March 1971 (NBS, NOAA, OCD).

- Conducted a survey of damage due to several severe tornados.

  Somes, N.F., Dikkers, R.D., and Boone, T.H., TN 558, "Lubbock Tornado: A Survey of Building Damage in an Urban Area," March 1971 (NBS).

  Mehta, K.C., McDonald, J.R., Marshall, R.D., Abernathy, J.J., and Boggs, D., "The Kalamazoo Tornado of May 13, 1980," Committee on Natural Disasters, National Research Council, July 1981.

- Provided assistance to the Australian government on determining causes of damage due to Cyclone Tracy and assisted in developing reconstruction recommendations.

  Marshall, R.D., BSS 86, "Engineering Aspects of Cyclone Tracy, Darwin, Australia, 1974," June 1976 (NBS).

- Conducted an investigation of damage caused in Washington, D.C. area in April 1975 due to severe winds.

  Yokel, F.Y., et al., TN 909, "Investigation of Wind Damage in the Metropolitan Washington, D.C. Area, April 3-4, 1975," May 1976 (NBS, DC PA).

EARTHQUAKE INVESTIGATIONS

- Briefed House Committee on Public Works on the damage caused by the San Fernando Earthquake of February 9, 1971 and documented building performance (OEP, DoD, NBS).

  Lew, H.S., Dikkers, R.D., Leyendecker, E.V., Pfrang, E.O., and Kramer, S., NBSIR-10556, "The San Fernando California Earthquake of February 9, 1971," 1971.

  Lew, H.S., Leyendecker, E.V., and Dikkers, R.D., BSS-40, "Engineering Aspects of the 1971 San Fernando Earthquake," 1971.

- Made recommendations to the Nicaraguan government for the repair of severely damaged buildings. Conducted investigation at the request of the State Department of building damage caused by the 1972 Managua Earthquake (USAID, NBS).

  Wright, R.N. and Kramer, S., TN 807, "Building Performance in the 1972 Managua Earthquake," 1973.

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*Organizations providing funding for each activity are indicated in parenthesis.

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- Conducted an investigation at the request of the State Department of building damage caused by the March 4, 1977 Romania Earthquake. Made recommendations to the State Department for the expenditure of U.S. funds provided to Romania for reconstruction following the earthquake.

  Fattal, S.G., Simiu, E., and Culver, C., SP 490, "Observations on the Behavior of Buildings in the Romania Earthquake of March 4, 1977," 1977.

- Conducted an investigation of the Miyagi-ken-oki, Japan Earthquake of June 12, 1978 in cooperation with the FHWA, USGS, and EERI. (Earthquake Engineering Research Institute) (NBS).

  Ellingwood, B., Editor, SP 592, "An Investigation of the Miyagi-ken oki, Japan Earthquake of June 12, 1978," 1980.

- Conducted a survey of damage caused by the 1979 Imperial County Earthquake in cooperation with the Earthquake Engineering Research Institute and contributed to EERI publication (NBS).

  "Reconnaissance Report - Imperial County, California, Earthquake, October 15, 1979," 1980.

BUILDING FAILURE INVESTIGATIONS

- Conducted construction failure investigations at the request of the Occupational Safety and Health Administration.

  Leyendecker, E.V. and Fattal, S.G., BSS 94, "Investigation of the Skyline Plaza Collapse in Fairfax County, Virginia," February 1977 (OSHA).

  Lew, H.S., et al., NBSIR 78-1578, "Investigation of Construction Failure of Reinforced Concrete Cooling Tower at Willow Island, West Virginia," November 1979 (OSHA).

  Lew, H.S., et al., NBSIR 80-1964, "Recommended Guidelines for Safety Inspection of Construction of Concrete Cooling Towers," January 1980 (OSHA).

  Lew, H.S., et al., NBSIR 80-2010, "Analysis of Construction Conditions Affecting the Structural Response of the Cooling Tower at Willow Island, West Virginia," July 1980 (OSHA).

  Redfield, Tobiasson, and Colbeck, Prepared for NBS by CRREL, "Estimated Snow, Ice, and Rain Load Prior to the Collapse of the Hartford Civic Center Arena Roof," April 1979 (OSHA).

  Lew, H.S., et al., NBSIR 81-2374, "Investigation of Construction Failure of Harbour Cay Condominium in Cocoa Beach, Florida," September 1981 (OSHA).

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Conducted an investigation into the failure of the Kansas City Hyatt Regency Walkways Collapse at the request of Mayor Berkley, Senator Eagleton and Danforth and Congressman Bolling.

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RICHARD N. WRIGHT

Date of Birth: May 17, 1932

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Education:

B.S., Civil Engineering, 1953
Syracuse University
M.S., Civil Engineering, 1955
Syracuse University
Ph.D., Civil Engineering, 1962
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Position:

Director, Center for Building Technology
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His professional experience includes: junior engineer with the Pennsylvania Railroad, 1953 to 1955; instructor, assistant professor, associate professor and professor of civil engineering at the University of Illinois at Urbana from 1957 to 1974; and at the National Bureau of Standards, Chief of the Structures Section, Building Research Division 1971 to 1972, Deputy Director-Technical, Center for Building Technology, 1972 to 1973, and Director, Center for Building Technology 1974 to present.

The Center for Building Technology (CBT) is the national building research laboratory. It conducts laboratory, field and analytical research. It develops technologies to predict, measure and test the performance of building materials, components, systems and practices. It works cooperatively with other organizations, private and public, to improve building practices, CBT does not promulgate or enforce building standards or regulations, but its results are widely used in the building industry and adopted by private and governmental organizations that have standards and codes responsibilities. CBT programs include: computer integrated construction, structural safety, earthquake hazards reduction, building physics, building equipment, quality of building materials, and cement hydration.

CBT has unique laboratory facilities and a staff of engineers and scientists of international reputation. Principal disciplines are structural, geotechnical, materials, mechanical and electrical engineering, physics, chemistry, architecture and behavioral sciences. Of the 100 professional staff members, 50 have earned doctoral degrees and 30 are registered engineers or architects. About 50 research associates sponsored by industry, visiting scholars from universities, and guest workers from foreign laboratories complement the professional staff.

Dr. Wright has published about 50 articles on computer-aided design, formulation and expression of design criteria, performance criteria for buildings, structural design methods for earthquakes and other dynamic loads, flow and fracture in structural metals and mechanics of thin-walled beam structures.

He is President of the International Council for Building Research, Studies and Documentation, Chairman of the Interagency Committee on Seismic Safety in Construction, U.S. Chairman of the U.S.-Japan Panel on Wind and Seismic Effects, member of the Board of the Lighting Research Institute (and was its founding Chairman), fellow of the American Society of Civil Engineers, and member of the International Union of Testing and Research Laboratories for Materials and Structures, Earthquake Engineering Research Institute, Sigma Xi, Phi Kappa Phi, and Tau Beta Pi. He registered as a professional engineer in New York in 1958 and as a structural engineer in Illinois in 1974.

He received the Gold Medal Award of the Department of Commerce in 1982 for distinguished achievement in the Federal Service, and the Special Presidential Award of the Illuminating Engineering Society of North America in 1983 for contributions to the organization of the Lighting Research Institute.

Mr. GORE. Thank you very much, Dr. Wright.

Do you think it is feasible that AEPIC could serve as the repository of information that we have asked you to maintain in this year's authorization bill?

Dr. WRIGHT. Indeed, it can. We have made copies of all of our work to date available to AEPIC, so it already is serving as a repository of the information that we have gained from our investigations of structural failures.

Mr. GORE. Now, is it at all feasible for the NBS to provide financial support to the Center—that will have to be specifically authorized, I take it, or do you think it's feasible under the language as it's now written?

Dr. WRIGHT. I think there are a couple levels of feasibility: One, the resources have to be made available to the Bureau of Standards in the first place; second, I think a specific authorization of support for AEPIC may help deal with the requirements for granting and contracting that we must deal with. Otherwise, we would have to consider proposals from any other group, public or private, that would wish to set itself up——

Mr. GORE. Maybe that's the way it should——

Dr. WRIGHT [continuing]. As a repository for information.

Mr. GORE. Maybe that's the way it should be. Maybe that's the way it should be.

Dr. WRIGHT. That's the way the procurement rules work at the present time.

Mr. GORE. Obviously they would have the inside track, based upon—based upon what they have demonstrated in the way of capability; wouldn't you think?

Dr. WRIGHT. Every time that we would be transferring funding to AEPIC, we would have to go through an explicit justification that they were the best qualified organization to carry out this role.

Mr. GORE. Yeah. Now, you testified at our last hearing that in many cases, the results of investigations of failures are sealed due to litigation. There seems to be some debate on the extent of that practice.

Some observers have agreed with your statement, yet other experts have told the subcommittee that cases where data is kept secret because it's filed away as a result of the legal settlement are—are rare. What do you—do you want to comment on that?

Dr. WRIGHT. I think that the investigation that your staff carried out on this subject is more comprehensive than any that we have carried out in the Bureau of Standards——

Mr. GORE. OK.

Dr. WRIGHT [continuing]. And would rely on your report.

Mr. GORE. I'll accept that answer. I appreciate that.

Now, the authorization bill contains language developed by this subcommittee giving the Bureau statutory authority to investigate failures at the discretion of the Director. In your opinion, would this authority help you in the future and give you more leverage in cases where there is resistance to your investigation on the part of owners of structures?

Dr. WRIGHT. The likely effects of the authority are to make it very clear to the Bureau of Standards that the Congress of the

United States expects it to conduct investigations of major failures, to make it very clear to State and local governments that there is a resource here that they can call on and it would be likely to stimulate the State and local governments to use their legal authorities in support of such investigations.

Mr. GORE. Very good.

Mr. McCandless.

Mr. MCCANDLESS. Thank you, Mr. Chairman.

Two areas I'd like to explore in the experience you had. You broke down the various aspects of failures into categories and I'm curious as to where you would put a couple of these: First, substandard materials not readily ascertainable at the site of construction. What do—is that a technical or a procedural failure?

Dr. WRIGHT. The—it has aspects of both. The nature of the inadequacy is a technical matter.

Mr. MCCANDLESS. I'm sorry, the nature of the——

Dr. WRIGHT. The nature of the inadequacy. For instance, an aggregate that had in it organic materials; that is the technical cause of the inadequacy of that aggregate——

Mr. MCCANDLESS. Uh-huh.

Dr. WRIGHT [continuing]. Containing of organic materials. Then, if those who had procured the aggregate and those responsible for testing it for its suitability had failed to carry out established procedures for detecting such organic materials in the aggregate and rejecting it, that would be a procedural failure.

Generally, failures occur for two reasons: Because there is an inadequacy of the structure in terms of strength, in terms of durability; and most often, already established practices that, if correctly applied, would screen out these technical inadequacies, have not been correctly applied.

Occasionally we find a failure where every practice that was followed was in accord with conventional good practice. The failure occurred from a mechanism that we had not yet properly understood, and then the cause is purely technical.

Most often, the causes are both technical and procedural.

Mr. MCCANDLESS. How often do you come across a set of circumstances where the specifications are compromised and ultimately result in failure?

Dr. WRIGHT. In practically every investigation that we have conducted, we have found that if established good practices, codes, and specifications have been followed, the failure would not have occurred.

Mr. MCCANDLESS. We talk about a depository of information. One could carry that out to an extreme where a 2 by 6 in a two-story house in downtown Nashville split resulting in the second floor coping compromised that had the wood been properly dried or some other factor, it wouldn't have happened. I'm using that as an extreme. Is that—where do you draw the line as to the level of public interest or involvement—justification of a public involvement in structural failures?

Dr. WRIGHT. I think there are two very important aspects to your question, sir. One deals with when an NBS investigation would be justified and I think an NBS investigation would be justified only when there is likely to be important technical information to be

gained or important public policy issues that require full illumination of technical causes.

The other aspect, however, is the need to record information on where we are succeeding and where we are failing. A relatively routine failure like that which you described still is valuable if the owner, or the architect, or the building department reports it to the Information Performance Center because it is a warning to people that these mistakes are being made—improperly cured lumber is being used and it warns them to watch out for it.

Mr. MCCANDLESS. In a given year, how many reports will you have investigated roughly and filed in what would be a depository set of circumstances?

Dr. WRIGHT. If we judge by recent experience, it's likely to be a single handful, one, three, five, judging by recent experience. Now, the proposed legislation may create much more intense demand for these services on the part of State and local governments, the design professions and such, which might increase the number beyond that.

But I would expect from our experience that there would generally be only two or three investigations per year.

Mr. MCCANDLESS. Thank you.

Thank you, Mr. Chairman.

Mr. GORE. Well, thank you very much, and Dr. Wright, we will continue to work closely with you on this matter. It's a subject that the subcommittee is concerned with and we hope we can make a constructive contribution in this area.

I'd like to thank all our witnesses today, particularly you, Dr. Wright, and commend you for the work that you're doing, and all of the other witnesses, and with that, this hearing is adjourned.

[Whereupon, at 11:45 a.m., the subcommittee was adjourned, to reconvene subject to the call of the Chair.]

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